ZOONOMIA;

OR,

The Laws of Organic Life.

PART SECOND.

By ERASMUS DARWIN, M. D.

A NEW EDITION;

WITH

An Introductory Addreſs,

AND

A SHORT APPENDIX,

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VOL. II.

PHILADELPHIA;
PRINTED BY T. DOBSON, AT THE STONE HOUSE
NO. 41, SOUTH SECOND STREET.
1797.

963/19

ZOONOMIA;

OR,

The Laws of Organic Life.

PART II.

CONTAINING

A CATALOGUE OF DISEASES

DISTRIBUTED INTO

NATURAL CLASSES ACCORDING TO THEIR
PROXIMATE CAUSES,

WITH THEIR

SUBSEQUENT ORDERS, GENERA, AND SPECIES,

AND WITH

THEIR METHODS OF CURE.

> Hæc, ut potero, explicabo; nec tamen, quaſi Pythius Apollo, certa ut ſint et fixa, quæ dixero; ſed ut Homunculus unus e multis probabiliora conjecturâ ſequens.
>
> Cic. Tusc. Disp. l. 1. 9.

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ZOONOMIA.

PART II.

CLASS III.

DISEASES OF VOLITION.

ORDO II.

Decreaſed Volition.

GENUS I.

With decreaſed Actions of the Muſcles.

OUR muſcles become fatigued by long contraction, and ceaſe for a time to be excitable by the will; owing to exhauſtion of the ſenſorial power, which reſides in them. After a ſhort interval of relaxation the muſcle regains its power of voluntary contraction; which is probably occaſioned by a new ſupply of the ſpirit of animation. In weaker people theſe contractions ceaſe ſooner, and therefore recur more frequently, and are attended with ſhorter intervals of relaxation, as exemplified in the quickneſs of the pulſe in fevers with debility, and in the tremors of the hands of aged or feeble people.

After a common degree of exhauſtion of the ſenſorial power in a muſcle, it becomes again gradually reſtored by the reſt of the muſcle; and even accumulated in thoſe muſcles, which are moſt frequently uſed; as in thoſe which conſtitute the capillaries of the ſkin after having been rendered torpid by cold. But in thoſe muſcles, which are generally obedient to volition, as thoſe of locomotion, though their uſual quantity of ſenſorial power is reſtored by their quieſcence, or in ſleep (for ſleep affects theſe parts of the ſyſtem only), yet but little accumulation of it ſucceeds. And this want of accumulation of the ſenſorial power in theſe muſcles, which are chiefly ſubſervient to volition, explains to us one cauſe of their greater tendency to paralytic affection.

It muſt be obſerved, that thoſe parts of the ſyſtem, which have been for a time quieſcent from want of ſtimulus, as the veſſels of the ſkin, when expoſed to cold, acquire an accumulation of ſenſorial power during their inactivity; but this does not happen at all, or in much leſs quantity, from their quieſcence after great expenditure of ſenſorial power by a previous exceſſive ſtimulus, as after intoxication. In this caſe the muſcles or organs of ſenſe gradually acquire their natural quantity of ſenſorial power; as after ſleep; but not an accumulation or ſuperabundance of it. And by frequent repetitions of exhauſtion by great ſtimulus, theſe veſſels ceaſe to acquire their whole natural quantity of ſenſorial power; as in the ſchirrous ſtomach, and ſchirrous liver, occaſioned by the great and frequent ſtimulus of vinous ſpirit; which may properly be termed irritative paralyſis of thoſe parts of the ſyſtem.

In the ſame manner in common palſies the inaction of the paralytic muſcles ſeems not to be owing to defect of the ſtimulus of the will, but to exhauſtion of ſenſorial power. Whence it frequently follows great exertion, as in Sect. XXXIV. 1. 7. Thus ſome parts of the ſyſtem may ceaſe to obey the will, as in common paralyſis; others may ceaſe to be obedient to ſenſation, as in the impotency of age; others to irritation, as in ſchirrous viſcera; and others to aſſociation, as in impediment of ſpeech; yet though all theſe may become inexcitable, or dead, in reſpect to that kind of ſtimulus, which has previouſly exhauſted them, whether of volition, or ſenſation, or irritation, or aſſociation, they may ſtill in many caſes be excited by the others.

SPECIES.

1. *Laſſitudo.* Fatigue or wearineſs after much voluntary exertion. From the too great expenditure of ſenſorial power the muſcles are with difficulty brought again into voluntary contraction; and ſeem to require a greater quantity or energy of volition for this purpoſe. At the ſame time they ſtill remain obedient to the ſtimulus of agreeable ſenſation, as appears in tired dancers finding a renovation of their aptitude to motion on the acquiſition of an agreeable partner; or from a tired child riding on a gold-headed cane, as in Sect. XXXIV. 2. 6. Theſe muſcles are likewiſe ſtill obedient to the ſenſorial power of aſſociation, becauſe the motions, when thus excited, are performed

in their deſigned directions, and are not broken into variety of geſticulation, as in St. Vitus's dance.

A laſſitude likewiſe frequently occurs with yawning at the beginning of ague-fits; where the production of ſenſorial power in the brain is leſs than its expenditure. For in this caſe the torpor may either originate in the brain, or the torpor of ſome diſtant parts of the ſyſtem may by ſympathy affect the brain, though in a leſs proportionate degree than the parts primarily affected.

2. *Vacillatio ſenilis.* Some elderly people acquire a ſee-ſaw motion of their bodies from one ſide to the other, as they ſit, like the oſcillation of a pendulum. By theſe motions the muſcles, which preſerve the perpendicularity of the body, are alternately quieſcent, and exerted; and are thus leſs liable to fatigue or exhauſtion. This therefore reſembles the tremors of old people above mentioned, and not thoſe ſpaſmodic movements of the face or limbs, which are called tricks, deſcribed in Claſs IV. 3. 2. 2. which originate from exceſs of ſenſorial power, or from efforts to relieve diſagreeable ſenſation, and are afterwards continued by habit.

3. *Tremor ſenilis.* Tremor of old age conſiſts of a perpetual trembling of the hands, or of the head, or of other muſcles, when they are exerted; and is erroneouſly called paralytic; and ſeems owing to the ſmall quantity of animal power reſiding in the muſcular

fibres. Theſe tremors only exiſt when the affected muſcles are excited into action, as in lifting a glaſs to the mouth, or in writing, or in keeping the body upright; and ceaſe again, when no voluntary exertion is attempted, as in lying down. Hence theſe tremors evidently originate from the too quick exhauſtion of the leſſened quantity of the ſpirit of animation. So many people tremble from fear or anger, when too great a part of the ſenſorial power is exerted on the organs of ſenſe, ſo as to deprive the muſcles, which ſupport the body erect, of their due quantity.

4. *Brachiorum paralyſis.* A numbneſs of the arms is a frequent ſymptom in hydrops thoracis, as explained in Claſs I. 2. 3. 14. and in Sect. XXIX. 5. 2.; it alſo accompanies the aſthma dolorificum, Claſs III. 1. 1. 11. and is owing probably to the ſame cauſe in both. In the colica ſaturnina a paralyſis affects the wriſts, as appears on the patient's extending his arm horizontally with the palm downwards, and is often attended with a tumor on the carpal or metacarpal bones. See Claſs IV. 2. 2. 10.

Mr. M——, a miner and well-ſinker, about three years ago, loſt the power of contracting both his thumbs; the balls or muſcles of the thumbs are much emaciated, and remain paralytic. He aſcribes his diſeaſe to immerſing his hands too long in cold water in the execution of his buſineſs. He ſays his hands had frequently been much benumbed before, ſo that he could not without difficulty clench them; but that they recovered their motion, as ſoon as they began to glow, after he had dried and covered them.

In this caſe there exiſted two injurious circumſtances of different kinds; one the violent and continued action of the muſcles, which deſtroys by exhauſting the ſenſorial power; and the other, the application of cold, which deſtroys by defect of ſtimulus. The cold ſeems to have contributed to the paralyſis by its long application, as well as the continued exertion; but as during the torpor occaſioned by the expoſure to cold, if the degree of it be not ſo great as to extinguiſh life, the ſenſorial power becomes accumulated; there is reaſon to believe, that the expoſing a paralytic limb to the cold for a certain time, as by covering it with ſnow or iced water for a few minutes, and then covering it with warm flannel, and this frequently repeated, might, by accumulation of ſenſorial power, contribute to reſtore it to a ſtate of voluntary excitability. As this accumulation of ſenſorial power, and conſequent glow, ſeems, in the preſent caſe, ſeveral times to have contributed to reſtore the numbneſs or inability of thoſe muſcles, which at length became paralytic. See Claſs I. 2. 3. 21.

M. M. Ether externally. Friction. Saline warm bath. Electricity.

5. *Raucedo paralytica.* Paralytic hoarſeneſs conſiſts in the almoſt total loſs of voice, which ſometimes continues for months, or even years, and is occaſioned by inability or paralyſis of the recurrent nerves, which

ſerve the muſcles of vocality, by opening or cloſing the larynx. The voice generally returns ſuddenly, even ſo as to alarm the patient. A young lady, who had many months been affected with almoſt a total loſs of voice, and had in vain tried variety of advice, recovered her voice in an inſtant, on ſome alarm as ſhe was dancing at an aſſembly. Was this owing to a greater exertion of volition than uſual? like the dumb young man, the ſon of Crœſus, who is related to have cried out, when he ſaw his father's life endangered by the ſword of his enemy, and to have continued to ſpeak ever afterwards. Two young ladies in this complaint ſeemed to be cured by electric ſhocks paſſed through the larynx every day for a fortnight. See Raucedo catarrhalis, Claſs II. 1. 3. 5.

M. M. An emetic. Electric ſhocks. Muſtard-ſeed, a large ſpoonful ſwallowed whole, or a little bruiſed, every morning. Valerian. Burnt ſponge. Bliſters on each ſide of the larynx. Sea-bathing. A gargle of decoction of ſeneca. Friction. Frequent endeavours to ſhout and ſing.

× 6. *Veſicæ urinariæ paralyſis.* Paralyſis of the bladder is frequently a ſymptom in inirritative fever; in this caſe the patient makes no water for a day or two; and the tumor of the bladder diſtended with urine may be ſeen by the ſhape of the abdomen, as if girt by a cord below the navel, or diſtinguiſhed by the hand. Many patients in this ſituation make no complaint, and ſuffer great injury by the inattention of

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their attendants; the water muſt be drawn off once or twice a day by means of a catheter, and the region of the bladder gently preſſed by the hand, whilſt the patient be kept in a ſitting or erect poſture.

M. M. Bark. Wine. Opium, a quarter of a grain every ſix hours. Balſam of copaiva or of Peru. Tincture of cantharides 20 drops twice a day, or repeated ſmall bliſters.

7. *Recti paralyſis.* Palſy of the rectum. The rectum inteſtinum, like the urinary bladder in the preceding article, poſſeſſes voluntary power of motion; though theſe volitions are at times uncontrollable by the will, when the acrimony of the contained feces, or their bulk, ſtimulate it to a greater degree. Hence it happens, that this part is liable to loſe its voluntary power by paralyſis, but is ſtill liable to be ſtimulated into action by the contained feces. This frequently occurs in fevers, and is a bad ſign as a ſymptom of general debility; and it is the ſenſibility of the muſcular fibres of this and of the urinary bladder remaining, after the voluntarity has ceaſed, which occaſions theſe two reſervoirs ſo ſoon to regain, as the fever ceaſes, their obedience to volition; becauſe the paralyſis is thus ſhewn to be leſs complete in thoſe caſes than in common hemiplegia; as in the latter the ſenſe of touch, though perhaps not the ſenſe of pain, is generally deſtroyed in the paralytic limb.

M. M. A ſponge introduced within the ſphincter ani to prevent the conſtant diſcharge, which ſhould have a ſtring put through it, by which it may be retracted.

8. *Pareſis voluntaria.* Indolence; or inaptitude to voluntary action. This debility of the exertion of voluntary efforts prevents the accompliſhment of all great events in life. It often originates from a miſtaken education, in which pleaſure or flattery is made the immediate motive of action, and not future advantage; or what is termed duty. This obſervation is of great value to thoſe, who attend to the education of their own children. I have ſeen one or two young married ladies of fortune, who perpetually became uneaſy, and believed themſelves ill, a week after their arrival in the country, and continued ſo uniformly during their ſtay; yet on their return to London or Bath immediately loſt all their complaints, and this repeatedly; which I was led to aſcribe to their being in their infancy ſurrounded with menial attendants, who had flattered them into the exertions they then uſed. And that in their riper years, they became torpid for want of this ſtimulus, and could not amuſe themſelves by any voluntary employment; but required ever after, either to be amuſed by other people, or to be flattered into activity. This I ſuppoſe, in the other ſex, to have ſupplied one ſource of ennui and ſuicide.

9. *Catalepſis* is ſometimes uſed for fixed ſpaſmodic contractions or tetanus, as deſcribed in Sect. XXXIV, 1, 5. and in Claſs III. 1, 1. 13. but is properly

ſimply an inaptitude to muſcular motion, the limbs remaining in any attitude in which they are placed. One patient, whom I ſaw in this ſituation, had taken much mercury, and appeared univerſally torpid. He ſat in a chair in any poſture he was put, and held a glaſs to his mouth for many minutes without attempting to drink, or withdrawing his hand. He never ſpoke, and it was at firſt neceſſary to compel him to drink broth; he recovered in a few weeks without relapſe.

10. *Hemiplègia.* Palſy of one ſide conſiſts in the total diſobedience of the affected muſcles to the power of volition. As the voluntary motions are not perpetually exerted, there is little ſenſorial power accumulated during their quieſcence, whence they are leſs liable to recover from torpor, and are thus more frequently left paralytic, or diſobedient to the power of volition, though they are ſometimes ſtill alive to painful ſenſation, as to the prick of a pin, and to heat; alſo to irritation, as in ſtretching and yawning; or to electric ſhocks. Where the paralyſis is complete the patient ſeems gradually to learn to uſe his limbs over again by repeated efforts, as in infancy; and, as time is required for this purpoſe, it becomes difficult to know, whether the cure is owing to the effect of medicines, or to the repeated efforts of the voluntary power.

The diſpute, whether the nerves decuſſate or croſs each other before they leave the cavities of the ſkull or ſpine, ſeems to be decided in the affirmative by comparative anatomy; as the optic nerves of ſome fiſh have been ſhewn evidently to croſs each other; as ſeen by Haller, Elem. Phyſiol. t. v. p. 349. Hence the application of bliſters, or of ether, or of warm fomentations, ſhould be on the ſide of the head oppoſite to that of the affected muſcles. This ſubject ſhould nevertheleſs be nicely determined, before any one ſhould trepan for the hydrocephalus internus, when the diſeaſe is ſhewn to exiſt only on one ſide of the brain, by a ſquinting affecting but one eye; as propoſed in Claſs I. 2. 5. 4. Dr. Sommering has ſhewn, that a true decuſſation of the optic nerves in the human ſubject actually exiſts, Elem. of Phyſiology by Blumenbach, tranſlated by C. Caldwell, Philadelphia. This further appears probable from the oblique direction and inſertion of each optic nerve, into the ſide of the eye next to the noſe, in a direct line from the oppoſite ſide of the brain.

The vomiting, which generally attends the attack of hemiplegia, is mentioned in Sect. XX. 8. and is ſimilar to that attending vertigo in ſea-ſickneſs, and at the commencement of ſome fevers. Black ſtools ſometimes attend the commencement of hemiplegia, which is probably an effuſion of blood from the biliary duct, where the liver is previouſly affected; or ſome blood may be derived to the inteſtines by its eſcaping from the vena cava into the receptacle of chyle during the diſtreſs of the paralytic attack; and may be conveyed from thence into the inteſtines by the retrograde motions of the lacteals; as probably ſometimes happens in diabætes. See Sect. XXVII. 2. Palſy of one ſide of the face is mentioned in Claſs II. 1. 4. 6. Paralyſis of the lacteals, of the liver, and of the veins, which are deſcribed in Sect. XXVIII. XXX. and XXVII. do not belong to this claſs, as they are not diſeaſes of voluntary motions.

M. M. The electric ſparks and ſhocks, if uſed early in the diſeaſe, are frequently of ſervice. A purge of aloes, or calomel. A vomit. Bliſter. Saline draughts. Then the bark. Mercurial ointment or ſublimate, where the liver is evidently diſeaſed; or where the gutta roſea has previouſly exiſted. Sudden alarm. Frequent voluntary efforts. Externally ether. Volatile alkali. Fomentation on the head. Friction. When children, who have ſuffered an hemiplegia, begin to uſe the affected arm, the other hand ſhould be tied up for half an hour three or four times a day; which obliges them at their play to uſe more frequent voluntary efforts with the diſeaſed limb, and thus ſooner to reſtore the diſſevered aſſociations of motion.

Dr. J. Alderſon has lately much recommended the leaves of rhus toxicodendron (ſumach), from one gr. to iv. of the dried powder to be taken three or four times a day. Eſſay on Rus Toxic. Johnſon, London, 1793. But it is difficult to know what medicine is of ſervice, as the movements of the muſcles muſt be learned, as in infancy, by frequent efforts.

11. *Paraplegia.* A palſy of the lower half of the body divided horizontally. Animals may be conceived to have double bodies, one half in general reſembling ſo exactly the other, and being ſupplied with ſeparate ſeats of nerves; this gives riſe to hemiplegia, or palſy of one half of the body divided vertically; but the paraplegia, or palſy of the lower parts of the ſyſtem, depends on an injury of the ſpinal marrow, or that part of the brain which is contained in the vertebræ of the back; by which all the nerves ſituated below the injured part are deprived of their nutriment, or precluded from doing their proper offices; and the muſcles, to which they are derived, are in conſequence diſobedient to the power of volition.

This ſometimes occurs from an external injury, as a fall from an eminence; of which I ſaw a deplorable inſtance, where the bladder and rectum, as well as the lower limbs, were deprived of ſo much of their powers of motion, as depended on volition or ſenſation; but I ſuppoſe not of that part of it, which depends on irritation. In the ſame manner as the voluntary muſcles in hemiplegia are ſometimes brought into action by irritation, as in ſtretching or pendiculation, deſcribed in Sect. VII. 1. 3.

But the moſt frequent cauſe of paraplegia is from a protuberance of one of the ſpinal vertebræ; which is owing to the innutrition or ſoftneſs of bones, deſcribed in Claſs I. 2. 2. 17. The cure of this deplorable diſeaſe is frequently effected by the ſtimulus of an iſſue placed on each ſide of the prominent ſpine, as firſt publiſhed by Mr. Pott. The other means recommended in ſoftneſs of bones ſhould alſo be attended to; both in reſpect to the internal medicines, and to the mechanical methods of ſupporting, or extending the ſpine; which laſt, however, in this caſe requires particular caution.

12. *Somnus.* In ſleep all voluntary power is ſuſpended, ſee Sect. XVIII. An unuſual quantity of ſleep is often produced by weakneſs. In this caſe ſmall doſes of opium, wine, and bark, may be given with advantage. For the periods of ſleep, ſee Claſs IV. 2. 4. 1.

The ſubſequent ingenious obſervations on the frequency of the pulſe, which ſometimes occurs in ſleep, are copied from a letter of Dr. Currie of Liverpool to the author.

"Though reſt in general perhaps renders the healthy pulſe ſlower, yet under certain circumſtances the contrary is the truth. A full meal without wine or other ſtrong liquor does not increaſe the frequency of my pulſe, while I ſit upright, and have my attention engaged. But if I take a recumbent poſture after eating, my pulſe becomes more frequent, eſpecially if my mind be vacant, and I become drowſy; and, if I ſlumber, this increaſed frequency is more conſiderable with heat and fluſhing.

"This I apprehend to be a general truth. The obſervation may be frequently made upon children;

and the reſtleſs and feveriſh nights experienced by many people after a full ſupper are, I believe, owing to this cauſe. The ſupper occaſions no inconvenience, whilſt the perſon is upright and awake; but, when he lies down and begins to ſleep, eſpecially if he does not perſpire, the ſymptoms above mentioned occur. Which may be thus explained in part from your principles. When the power of volition is aboliſhed, the other ſenſorial actions are increaſed. In ordinary ſleep this does not occaſion increaſed frequency of the pulſe; but where ſleep takes place during the proceſs of digeſtion, the digeſtion itſelf goes on with increaſed rapidity. Heat is excited in the ſyſtem faſter than it is expended; and operating on the ſenſitive actions, it carries them beyond the limitation of pleaſure, producing, as is common in ſuch caſes, increaſed frequency of pulſe.

" It is to be obſerved, that in ſpeaking of the heat generated under theſe circumſtances, I do not allude to any chemical evolution of heat from the food in the proceſs of digeſtion. I doubt if this takes place to any conſiderable degree, for I do not obſerve that the parts incumbent on the ſtomach are increaſed in heat during the moſt hurried digeſtion. It is on ſome parts of the ſurface, but more particularly on the extremities of the body, that the increaſed heat excited by digeſtion appears, and the heat thus produced ariſes, as it ſhould ſeem, from the ſympathy between the ſtomach and the veſſels of the ſkin. The parts moſt affected are the palms of the hands and the ſoles of the feet.

Even there the thermometer ſeldom riſes above 97 or 98 degrees, a temperature not higher than that of the trunk of the body; but three or four degrees higher than the common temperature of theſe parts, and therefore producing an uneaſy ſenſation of heat, a ſenſation increaſed by the great ſenſibility of the parts affected.

"That the increaſed heat excited by digeſtion in ſleep is the cauſe of the accompanying fever, ſeems to be confirmed by obſerving, that if an increaſed expenditure of heat accompanies the increaſed generation of it (as when perſpiration on the extremities or ſurface attends this kind of ſleep) the frequent pulſe and fluſhed countenance do not occur, as I know by experiment. If, during the feveriſh ſleep already mentioned, I am awakened, and my attention engaged powerfully, my pulſe becomes almoſt immediately ſlower, and the fever gradually ſubſides."

From theſe obſervations of Dr. Currie it appears, that, while in common ſleep the actions of the heart, arteries, and capillaries, are ſtrengthened by the accumulation of ſenſorial power during the ſuſpenſion of voluntary action, and the pulſe in conſequence becomes fuller and ſlower; in the feveriſh ſleep above deſcribed the actions of the heart, arteries, and capillaries, are quickened as well as ſtrengthoned by their conſent with the increaſed actions of the ſtomach, as well as by the ſtimulus of the new chyle introduced into the circulation. For the ſtomach, and all other parts of the ſyſtem, being more ſenſible and more

irritable

irritable during ſleep, Sect. XVIII. 15. and probably more ready to act from aſſociation, are now exerted with greater velocity as well as ſtrength, conſtituting a temporary fever of the ſenſitive irritated kind, reſembling the fever excited by wine in the beginning of intoxication; or in ſome people by a full meal in their waking hours. Sect XXXV. 1.

On waking, this increaſed ſenſibility and irritability of the ſyſtem ceaſes by the renewed exertions of volition; in the ſame manner as more violent exertions of volition deſtroy greater pains; and the pulſe in conſequence ſubſides along with the increaſe of heat; if more violent efforts of volition are exerted, the ſyſtem becomes ſtill leſs affected by ſenſation or irritation. Hence the fever and vertigo of intoxication are leſſened by intenſe thinking, Sect. XXI. 8; and inſane people are known to bear the pain of cold and hunger better than others, Sect. XXXIV. 2. 5; and laſtly, if greater voluntary efforts exiſt, as in violent anger or violent exerciſe, the whole ſyſtem is thrown into more energetic action, and a voluntary fever is induced, as appears by the red ſkin, quickened pulſe, and increaſe of heat; whence dropſies and fevers with debility are not unfrequently removed by inſanity.

Hence the exertion of the voluntary power in its natural degree diminiſhes the increaſed ſenſibility, and irritability, and probably the increaſed aſſociability, which occurs during ſleep; and thus reduces the frequency of the pulſe in the feveriſh ſleep after a full meal. In its more powerful ſtate of exertion, it diminiſhes or deſtroys ſenſations and irritations, which are ſtronger than natural, as in intoxication, or which precede convulſions, or inſanity. In its ſtill more powerful degree, the ſuperabundance of this ſenſorial power actuates and invigorates the whole moving ſyſtem, giving ſtrength and frequency to the pulſe, and an univerſal glow both of colour and of heat, as in violent anger, or outrageous inſanities.

If, in the feveriſh ſleep above deſcribed, the ſkin becomes cooled by the evaporation of much perſpirable matter, or by the application of cooler air, or thinner clothes, the actions of the cutaneous capillaries are leſſened by defect of the ſtimulus of heat, which counteracts the increaſe of ſenſibility during ſleep, and the pulſations of the heart and arteries become ſlower from the leſſened ſtimulus of the particles of blood thus cooled in the cutaneous and pulmonary veſſels. Hence the admiſſion of cold air, or ablution with ſubtepid or with cold water, in fevers with hot ſkin, whether they be attended with arterial ſtrength, or arterial debility, renders the pulſe ſlower; in the former caſe by diminiſhing the ſtimulus of the blood, and in the latter by leſſening the expenditure of ſenſorial power. See Suppl. I. 8. and 15.

13. *Incubus.* The night-mare is an imperfect ſleep, where the deſire of locomotion is vehement, but the muſcles do not obey the will; it is attended with great uneaſineſs, a ſenſe of ſuffocation, and frequently with fear. It is cauſed by violent fatigue, or drunkenneſs,

or indigeſtible food, or lying on the back, or perhaps from many other kinds of uneaſineſs in our ſleep, which may originate either from the body or mind.

Now as the action of reſpiration is partly voluntary, this complaint may be owing to the irritability of the ſyſtem being too ſmall to carry on the circulation of the blood through the lungs during ſleep, when the voluntary power is ſuſpended. Whence the blood may accumulate in them, and a painful oppreſſion ſupervene; as in ſome hæmorrhages of the lungs, which occur during ſleep; and in patients much debilitated by fevers. See Somnus interruptus, Claſs I. 2. 1. 3. and I. 2. 1. 9.

Great fatigue with a full ſupper and much wine, I have been well informed by one patient, always produced this diſeaſe in himſelf to a great degree. Now the general irritability of the ſyſtem is much decreaſed by fatigue, as it exhauſts the ſenſorial power; and ſecondly, too much wine and ſtimulating food will again diminiſh the irritability of ſome parts of the ſyſtem, by employing a part of the ſenſorial power, which is already too ſmall, in digeſting a great quantity of aliment; and in increaſing the motions of the organs of ſenſe in conſequence of ſome degree of intoxication, whence difficulty of breathing may occur from the inirritability of the lungs, as in Claſs I. 2. 1. 3.

M. M. To ſleep on a hard bed with the head raiſed. Moderate ſupper. The bark. By ſleeping on a harder bed the patient will turn himſelf more frequently, and not be liable to ſleep too profoundly, or lie too long in one poſture. To be awakened frequently by an alarm clock.

14. *Lethargus.* The lethargy is a ſlighter apoplexy. It is ſuppoſed to originate from univerſal preſſure on the brain, and is ſaid to be produced by compreſſing the ſpinal marrow, where there is a deficiency of the bone in the ſpina bifida. See Sect. XVIII. 20. Whereas in the hydrocephalus there is only a partial preſſure of the brain; and probably in nervous fevers with ſtupor the preſſure on the brain may affect only the nerves of the ſenſes, which lie within the ſkull, and not thoſe nerves of the medulla oblongata, which principally contribute to move the heart and arteries; whence in the lethargic or apoplectic ſtupor the pulſe is ſlow as in ſleep, whereas in nervous fever the pulſe is very quick and feeble, and generally ſo in hydrocephalus.

In caſes of obſtructed kidneys, whether owing to the tubuli uriniferi being totally obſtructed by calculous matter, or by their paralyſis, a kind of drowſineſs or lethargy comes on about the eighth or ninth day, and the patient gradually ſinks. See Claſs I. 1. 3. 9.

15. *Syncope epileptica*, is a temporary apoplexy, the pulſe continuing in its natural ſtate, and the voluntary power ſuſpended. This terminates the paroxyſms of epilepſy.

When the animal power is much exhauſted by the preceding convulſions, ſo that the motions from ſenſation as well as thoſe from volition are ſuſpended; in a quarter or half an hour the ſenſorial power becomes reſtored, and if no pain, or irritation producing pain, recurs, the fit of epilepſy ceaſes; if the pain recurs, or the irritation, which uſed to produce it, a new fit of convulſion takes place, and is ſucceeded again by a ſyncope. See Epilepſy, Claſs III. 1. 1. 7.

16. *Apoplexia.* Apoplexy may be termed an univerſal palſy, or a permanent ſleep. In which, where the pulſe is weak, copious bleeding muſt be injurious; as is well obſerved by Dr. Heberden, Tranſ. of the College.

Mr. ——, about 70 years of age, had an apoplectic ſeizure. His pulſe was ſtrong and full. One of the temporal arteries was opened, and about ten ounces of blood ſuddenly taken from it. He ſeemed to receive no benefit from this operation; but gradually ſunk, and lived but a day or two.

If apoplexy ariſes from the preſſure of blood extravaſated on the brain, one moderate veneſection may be of ſervice to prevent the further effuſion of blood; but copious veneſection muſt be injurious by weakening the patient; ſince the effuſed blood muſt have time, as in common vibices or bruiſes, to undergo a chemico-animal proceſs, ſo to change its nature as to fit it for abſorption; which may take two or three weeks, which time a patient weakened by repeated veneſection or arteriotomy may not ſurvive.

Mrs. ——, about 40 years old, had an apoplectic ſeizure after great exertion from fear; ſhe had lain about 24 hours without ſpeech, or having ſwallowed any liquid. She was then forcibly raiſed in bed, and a ſpoonful of ſolution of aloes in wine put into her mouth, and the end of the ſpoon withdrawn, that ſhe might more eaſily ſwallow the liquid.—This was done every hour, with broth, and wine and water intervening, till evacuations were procured; which with other means had good effect, and ſhe recovered, except that a conſiderable degree of hemiplegia remained, and ſome imperfection of her ſpeech.

Many people, who have taken ſo much vinous ſpirit as to acquire the temporary apoplexy of intoxication, and are not improperly ſaid to be dead-drunk, have died after copious veneſection, I ſuppoſe in conſequence of it. I once ſaw at a public meeting two gentlemen in the drunken apoplexy; they were totally inſenſible with low pulſe, on this account they were directed not to loſe blood, but to be laid on a bed with their heads high, and to be turned every half hour; as ſoon as they could ſwallow, warm tea was given them, which evacuated their ſtomachs, and they gradually recovered, as people do from leſs degrees of intoxication.

M. M. Cupping on the occiput. Veneſection once in moderate quantity. Warm fomentations long continued and frequently repeated on the ſhaved head. Solution of aloes. Clyſters with ſolution of aloe and oil of amber. A bliſter on the ſpine. An emetic.

Afterwards the bark, and ſmall does of chalybeates. Small electric ſhocks through the head. Errhines. If ſmall doſes of opium?

17. *Mors a frigore.* Death from cold. The unfortunate travellers, who almoſt every winter periſh in the ſnow, are much exhauſted by their efforts to proceed on their journey, as well as benumbed by cold. And as much greater exerciſe can be borne without fatigue in cold weather than in warm; becauſe the exceſſive motions of the cutaneous veſſels are thus prevented, and the conſequent waſte of ſenſorial power; it may be inferred, that the fatigued traveller becomes paralytic from violent exertion as well as by the application of cold.

Great degrees of cold affect the motions of thoſe veſſels moſt, which have been generally excited into action by irritation; for when the feet are much benumbed by cold, and painful, and at the ſame time almoſt inſenſible to the touch of external objects, the voluntary muſcles retain their motions, and we continue to walk on; the ſame happens to the fingers of children in throwing ſnow-balls, the voluntary motions of the muſcles continue, though thoſe of the cutaneous veſſels are benumbed into inactivity.

Mr. Thompſon, an elderly gentleman of Shrewſbury, was ſeized with hemiplegia in the cold bath; which I ſuppoſe might be owing to ſome great energy of exertion, as much as to the coldneſs of the water. As in the inſtance given of Mr. Nairn, who, by the exertion to ſave his relation, periſhed himſelf. See Sect. XXXIV. 1. 7.

Whence I conclude, that though heat is a fluid neceſſary to muſcular motion, both perhaps by its ſtimulus, and by its keeping the minute component parts of the ultimate fibrils of the muſcles or organs of ſenſe at a proper diſtance from each other; yet that paralyſis, properly ſo called, is the conſequence of exhauſtion of ſenſorial power by exertion. And that the accumulations of it during the torpor of the cutaneous veſſels by expoſure to cold, or of ſome internal viſcus in the cold fits of agues, are frequently inſtrumental in recovering the uſe of paralytic limbs, or of the motions of other paralytic parts of the ſyſtem. See Spec. 4. of this genus.

Animal bodies reſiſt the power of cold probably by their exertions in conſequence of the pain of cold, ſee Botan. Gard. V. 1, additional note xii. But if theſe increaſed exertions be too violent, ſo as to exhauſt the ſenſorial power in producing unneceſſary motions, the animal will probably ſooner periſh. Thus a moderate quantity of wine or ſpirit repeated at proper intervals of time might be of ſervice to thoſe, who are long expoſed to exceſſive cold, both by increaſing the action of the capillary veſſels, and thus producing heat, and perhaps by increaſing in ſome degree the ſecretion of ſenſorial power in the brain. But the contrary muſt happen when taken immoderately, and not at due intervals. A well atteſted hiſtory was once related to me of two men, who ſet out on foot to travel in the ſnow, one of whom drank two or three glaſſes of brandy before they began their journey, the other contented himſelf with his uſual diet and potation; the former of whom periſhed in ſpite of any aſſiſtance his companion could afford him; and the other performed his journey with ſafety. In this caſe the ſenſorial power was exhauſted by the unneceſſary motions of incipient intoxication by the ſtimulus of the brandy, as well as by the exertions of walking; which ſo weakened the dram-drinker, that the cold ſooner deſtroyed him; that is, he had not power to produce ſufficient muſcular or arterial action, and in conſequence ſufficient heat, to ſupply the great expenditure of it. Hence the capillaries of the ſkin firſt ceaſe to act, and become pale and empty; next thoſe which are immediately aſſociated with them, as the extremities of the pulmonary artery, as happens on going into the cold bath. By the continued inaction of theſe parts of the vaſcular ſyſtem the blood becomes accumulated in the internal arteries, and the brain is ſuppoſed to be affected by its compreſſion; becauſe theſe patients are ſaid to ſleep, or to become apoplectic, before they die. I overtook a fiſhman aſleep on his panniers on a very cold froſty night, but on waking him he did not appear to be in any degree of ſtupor. See Claſs I. 2. 2. 1.

When travellers are benighted in deep ſnow, they might frequently be ſaved by covering themſelves in it, except a ſmall aperture for air; in which ſituation the lives of hares, ſheep, and other animals, are ſo often preſerved. The ſnow, both in reſpect to its component parts, and to the air contained in its pores, is a bad conductor of heat, and will therefore well keep out the external cold; and as the water, when part of it diſſolves, is attracted into the pores of the remainder of it, the ſituation of an animal beneath it is perfectly dry; and, if he is in contact with the earth, he is in a degree of heat between 48, the medium heat of the earth, and 32, the freezing point; that is, in 40 degrees of heat, in which a man thus covered will be as warm as in bed. See Botan. Garden, V. II. notes on Anemone, Barometz, and Muſchus. If theſe facts were more generally underſtood, it might annually ſave the lives of many.

After any part of the vaſcular ſyſtem of the body has been long expoſed to cold, the ſenſorial power is ſo much accumulated in it, that on coming into a warm room the pain of hotach is produced, and inflammation, and conſequent mortification, owing to the great exertion of thoſe veſſels, when again expoſed to a moderate degree of warmth. See Sect. XII. 5. Whence the propriety of applying but very low degrees of heat to limbs benumbed with cold at firſt, as of ſnow in its ſtate of diſſolving, which is at 32 degrees of heat, or of very cold water. A French writer has obſerved, that if frozen apples be thawed gradually by covering them with thawing ſnow, or immerſing them in very cold water, that they do not loſe their taſte; if this fact was well aſcertained, it might teach us how to preſerve other ripe fruits in ice-houſes for winter conſumption.

ORDO II.

Decreaſed Volition.

GENUS II.

With decreaſed Actions of the Organs of Senſe.

SPECIES.

1. *Recollectionis jactura.* Loſs of recollection. This is the defect of memory in old people, who forget the actions of yeſterday, being incapable of voluntary recollection, and yet remember thoſe of their youth, which by frequent repetition are introduced by aſſociation or ſuggeſtion. This is properly the paralyſis of the mind; the organs of ſenſe do not obey the voluntary power; that is, our ideas cannot be recollected, or acted over again by the will.

After an apoplectic attack the patients, on beginning to recover, find themſelves moſt at a loſs in recollecting proper names of perſons or places; as thoſe words have not been ſo frequently aſſociated with the ideas they ſtand for, as the common words of a language. Mr. ———, a man of ſtrong mind, of a ſhort necked family, many of whom had ſuffered by apoplexy, after an apoplectic fit on his recovering the uſe of ſpeech, after repeated trials to remember the name of a perſon or place, applauded himſelf, when he ſucceeded, with ſuch a childiſh ſmile on the partial return of his ſagacity, as very much affected me.—

Not long, alas! to return; for another attack in a few weeks deſtroyed the whole.

I ſaw a child after the ſmall-pox, which was left in this ſituation; it was lively, active, and even vigorous; but ſhewed that kind of ſurpriſe, which novelty excites, at every object it viewed; and that as often as it viewed it. I never heard the termination of the caſe.

2. *Stultitia voluntaria.* Voluntary folly. The abſence of voluntary power and conſequent incapacity to compare the ideas of preſent and future good. Brute animals may be ſaid to be in this ſituation, as they are in general excited into action only by their preſent painful or pleaſurable ſenſations. Hence though they are liable to ſurpriſe, when their paſſing trains of ideas are diſſevered by violent ſtimuli; yet are they not affected with wonder or aſtoniſhment at the novelty of objects; as they poſſeſs but in a very inferior degree, that voluntary power of comparing the preſent ideas with thoſe previouſly acquired, which diſtinguiſhes mankind; and is termed analogical reaſoning, when deliberatively exerted; and intuitive analogy, when uſed without our attention to it, and which always preſerves our hourly trains of ideas conſiſtent with truth and nature. See Sect. XVII. 3. 7.

3. *Credulitas.* Credulity. Life is ſhort, opportunities of knowledge rare; our ſenſes are fallacious, our reaſonings uncertain, man therefore ſtruggles with

x [illegible] — Lib. I. Aph. 9

with perpetual error from the cradle to the coffin. He is neceſſitated to correct experiment by analogy, and analogy by experiment; and not always to reſt ſatisfied in the belief of facts even with this two-fold teſtimony, till future opportunities, or the obſervations of others, concur in their ſupport.

Ignorance and credulity have ever been companions, and have miſled and enſlaved mankind; philoſophy has in all ages endeavoured to oppoſe their progreſs, and to looſen the ſhackles they had impoſed; philoſophers have on this account been called unbelievers: unbelievers of what? of the fictions of fancy, of witchcraft, hobgobblins, apparitions, vampires, fairies; of the influence of ſtars on human actions, miracles wrought by the bones of ſaints, the flights of ominous birds, the predictions from the bowels of dying animals, expounders of dreams, fortune-tellers, conjurors, modern prophets, necromancy, cheiromancy, animal magnetiſm, with endleſs variety of folly? Theſe they have diſbelieved and deſpiſed, but have ever bowed their hoary heads to truth and Nature.

Mankind may be divided in reſpect to the facility of their belief or conviction into two claſſes; thoſe, who are ready to aſſent to ſingle facts from the evidence of their ſenſes, or from the ſerious aſſertions of others; and thoſe, who require analogy to corroborate or authenticate them.

Our firſt knowledge is acquired by our ſenſes; but theſe are liable to deceive us, and we learn to detect theſe deceptions by comparing the ideas preſented to us by one ſenſe with thoſe preſented by another.

Thus when we firſt view a cylinder, it appears to the eye as a flat ſurface with different ſhades on it, till we correct this idea by the ſenſe of touch, and find its ſurface to be circular; that is, having ſome parts gradually receding further from the eye than others. So when a child, or a cat, or a bird, firſt ſees its own image in a looking-glaſs, it believes that another animal exiſts before it, and detects this fallacy by going behind the glaſs to examine, if another tangible animal really exiſts there.

Another exuberant ſource of error conſiſts in the falſe notions, which we receive in our early years from the deſign or ignorance of our inſtructors, which affect all our future reaſoning by their perpetual intruſions; as thoſe habits of muſcular actions of the face or limbs, which are called tricks, when contracted in infancy continue to the end of our lives.

A third great ſource of error is the vivacity of our ideas of imagination, which perpetually intrude themſelves by various aſſociations, and compoſe the farrago of our dreams; in which, by the ſuſpenſion of volition, we are precluded from comparing the ideas of one ſenſe with thoſe of another, or the incongruity of their ſucceſſions with the uſual courſe of nature, and thus to detect their fallacy. Which we do in our waking hours by a perpetual voluntary exertion, a proceſs of the mind above mentioned, which we have termed intuitive analogy. Sect. XVII. 3. 7.

This analogy preſuppoſes an acquired knowledge of things, hence children and ignorant people are the moſt credulous, as not poſſeſſing much knowledge of the uſual courſe of nature; and ſecondly, thoſe are moſt credulous, whoſe faculty of comparing ideas, or the voluntary exertion of it, is ſlow or imperfect. Thus if the power of the magnetic needle of turning towards the north, or the ſhock given by touching both ſides of an electrized coated jar, was related for the firſt time to a philoſopher, and to an ignorant perſon; the former would be leſs ready to believe them, than the latter; as he would find nothing ſimilar in nature to compare them to, he would again and again repeat the experiment, before he would give it his entire credence; till by theſe repetitions it would ceaſe to be a ſingle fact, and would therefore gain the evidence of analogy. But the latter, as having leſs knowledge of nature, and leſs facility of voluntary exertion, would more readily believe the aſſertions of others, or a ſingle fact, as preſented to his own obſervation. Of this kind are the bulk of mankind; they continue throughout their lives in a ſtate of childhood, and have thus been the dupes of prieſts and politicians in all countries and in all ages of the world.

In regard to religious matters, there is an intellectual cowardice inſtilled into the minds of the people from their infancy, which prevents their inquiry: credulity is made an indiſpenſible virtue; to inquire or exert their reaſon in religious matters is denounced as ſinful; and in the catholic church is puniſhed with more ſevere penances than moral crimes. But in reſpect to our belief of the ſuppoſed medical facts, which are publiſhed by variety of authors; many of whom are ignorant, and therefore credulous; the golden rule of David Hume may be applied with great advantage. "When two miraculous aſſertions oppoſe each other, believe the leſs miraculous." Thus if a perſon is ſaid to have received the ſmall-pox a ſecond time, and to have gone through all the ſtages of it, one may thus reaſon: twenty thouſand people have been expoſed to the variolous contagion a ſecond time without receiving the variolous fever, to every one who has been ſaid to have thus received it; it appears therefore leſs miraculous, that the aſſerter of this ſuppoſed fact has been deceived, or wiſhes to deceive, than that it has ſo happened contrary to the long experienced order of nature.

M. M. The method of cure is to increaſe our knowledge of the laws of nature, and our habit of comparing whatever ideas are preſented to us with thoſe known laws, and thus to counteract the fallacies of our ſenſes, to emancipate ourſelves from the falſe impreſſions which we have imbibed in our infancy, and to ſet the faculty of reaſon above that of imagination.

THE ORDERS AND GENERA OF THE FOURTH CLASS OF DISEASES.

CLASS IV.

DISEASES OF ASSOCIATION.

ORDO I.

Increaſed Aſſociate Motions.

GENERA.

1. Catenated with irritative motions.
2. Catenated with ſenſitive motions.
3. Catenated with voluntary motions.
4. Catenated with external influences.

ORDO II.

Decreaſed Aſſociate Motions.

GENERA.

1. Catenated with irritative motions.
2. Catenated with ſenſitive motions.
3. Catenated with voluntary motions.
4. Catenated with external influences.

ORDO III.

Retrograde Aſſociate Motions.

GENERA.

1. Catenated with irritative motions.
2. Catenated with ſenſitive mations.
3. Catenated with voluntary motions.
4. Catenated with external influences.

THE ORDERS, GENERA, AND SPECIES, OF THE FOURTH CLASS OF DISEASES.

CLASS IV.

DISEASES OF ASSOCIATION.

ORDO I.

Increaſed Aſſociate Motions.

GENUS I.

Catenated with Irritative Motions.

SPECIES.

1. *Rubor vultûs pranſorum.*	Fluſhing of the face after dinner.
2. *Sudor ſtragulis immerſorum.*	Sweat from covering the face in bed.
3. *Ceſſatio ægritudinis cute excitata.*	Cure of ſickneſs by ſtimulating the ſkin.
4. *Digeſtio aucta frigore cutaneo.*	Digeſtion increaſed by coldneſs of the ſkin.
5. *Catarrhus a frigore cutaneo.*	Catarrh from cold ſkin.
6. *Abſorptio cellularis aucta vomitu.*	Cellular abſorption increaſed by vomiting.
7. *Syngultus nephriticus.*	Nephritic hiccough.
8. *Febris irritativa.*	Irritative fever.

GENUS II.

Catenated with Senſitive Motions.

SPECIES.

1.	*Lacrymarum fluxus ſympatheticus.*	Sympathetic tears.
2.	*Sternutatio a lumine.*	Sneezing from light.
3.	*Dolor dentium a ſtridore.*	Tooth-edge from grating ſounds.
4.	*Riſus ſardonicus.*	Sardonic ſmile.
5.	*Salivæ fluxus cibo viſo.*	Flux of ſaliva at ſight of food.
6.	*Tenſio mamularum viſo puerulo.*	Tenſion of the nipples of lacteſcent women at ſight of the child.
7.	*Tenſio penis in hydrophobia.*	Tenſion of the penis in hydrophobia.
8.	*Teneſmus calculoſus.*	Teneſmus from ſtone.
9.	*Polypus narium ex aſcaride.*	Polypus of the noſe from aſcarides.
10.	*Crampus ſurarum in diarrhœa.*	Cramp from diarrhœa.
11.	*Zona ignea nephritica.*	Nephritic ſhingles.
12.	*Eruptio variolarum.*	Eruption of ſmall-pox.
13.	*Gutta roſea ſtomatica.*	Stomatic roſy drop.
14.	———— *hepatica.*	Hepatic roſy drop.
15.	*Podagra.*	Gout.
16.	*Rheumatiſmus.*	Rheumatiſm.
17.	*Eryſipelas.*	Eryſipelas.

18. *Teſtium tumor in gonorrhœa.*	Swelled teſtes in gonorrhœa.
19. ———— *in parotitide.*	———— in mumps.

GENUS III.

Catenated with Voluntary Motions.

SPECIES.

1. *Deglutitio invita.*	Involuntary deglutition.
2. *Nictitatio invita.*	———— nictitation.
3. *Riſus invitus.*	———— laughter.
4. *Luſus digitorum invitus.*	———— actions with the fingers.
5. *Unguium morſiuncula invita.*	———— biting the nails.
6. *Vigilia invita.*	———— watchfulneſs.

GENUS IV.

Catenated with External Inſluences.

SPECIES.

1. *Vita ovi.*	Life of an egg.
2. *Vita hiemi-dormientium.*	Life of winter-ſleepers.
3. *Pullulatio arborum.*	Budding of trees.
4. *Orgaſmatis venerei periodus.*	Periods of venereal deſire.
5. *Brachii concuſſio electrica.*	Electric ſhock through the arm.
6. *Oxygenatio ſanguinis.*	Oxygenation of the blood.
7. *Humectatio corporis.*	Humectation of the body.

ORDO II.

Decreaſed Aſſociate Motions.

GENUS I.

Catenated with Irritative Motions.

SPECIES.

1.	*Cutis frigida pranſorum.*	Chillneſs after dinner.
2.	*Pallor urinæ pranſorum.*	Pale urine after dinner.
3.	———— *a frigore cutaneo.*	———— from cold ſkin.
4.	*Pallor ex ægritudine.*	Paleneſs from ſickneſs.
5.	*Dyſpnœa a balneo frigido.*	Shortneſs of breath from cold bathing.
6.	*Dyſpepſia a pedibus frigidis.*	Indigeſtion from cold feet.
7.	*Tuſſis a pedibus frigidis.*	Cough from cold feet.
8.	—— *hepatica.*	Liver-cough.
9.	—— *arthritica.*	Gout-cough.
10.	*Vertigo rotatoria.*	Vertigo rotatory.
11.	——— *viſualis.*	——— viſual.
12.	——— *ebrioſa.*	——— inebriate.
13.	——— *febriculoſa.*	——— feveriſh.
14.	——— *cerebroſa.*	——— from the brain.
15.	*Murmur aurium vertiginoſum.*	Noiſe in the ears.
16.	*Tactus, guſtus, olfactus vertiginoſi.*	Vertiginous touch, taſte, ſmell.
17.	*Pulſus mollis a vomitione.*	Soft pulſe in vomiting.

18. *Pulſus intermittens a ventriculo.*	Intermittent pulſe from the ſtomach.
19. *Febris inirritativa.*	Inirritative fever.

GENUS II.

Catenated with Senſitive Motions.

SPECIES.

1. *Torpor genæ a dolore dentis.*	Coldneſs of the cheek from tooth-ach.
2. *Stranguria a dolore veſicæ.*	Strangury from pain of the bladder.
3. ———— *convulſiva.*	Convulſive ſtrangury.
4. *Dolor termini ductûs choledochi.*	Pain of the end of the bile-duct.
5. *Dolor pharyngis ab acido gaſtrico.*	Pain of the throat from gaſtric acid.
6. *Pruritus narium a vermibus.*	Itching of the noſe from worms.
7. *Cephalæa.*	Head-ach.
8. *Hemicrania et otalgia.*	Partial head-ach, and ear-ach.
9. *Dolor humeri in hepatitide.*	Pain of ſhoulder in hepatitis.
10. *Torpor pedum variolâ erumpente.*	Cold feet in eruption of ſmall-pox.
11. *Teſtium dolor nephriticus.*	Nephritic pain of teſtis.
12. *Dolor digiti minimi ſympatheticus,*	Pain of little finger from ſympathy.

13. *Dolor*

13. *Dolor brachii in hydrope pectoris.*	Pain of the arm in dropſy of the cheſt.
14. *Diarrhœa a dentitione.*	Diarrhœa from toothing.

GENUS III.

Catenated with Voluntary Motions.

SPECIES.

1. *Titubatio linguæ.*	Impediment of ſpeech.
2. *Chorea ſancti viti.*	St. Vitus' dance.
3. *Riſus.*	Laughter.
4. *Tremor ex irâ.*	Trembling from anger.
5. *Rubor ex irâ.*	Redneſs from anger.
6. —— *criminati.*	Bluſh of guilt.
7. *Tarditas paralytica.*	Slowneſs from palſy.
8. ——— *ſenilis.*	——— of age.

GENUS IV.

Catenated with External Influences.

SPECIES.

1. *Somni periodus.*	Periods of ſleep.
2. *Studii inanis periodus.*	——— of reverie.
3. *Hemicraniæ periodus.*	——— of head-ach.
4. *Epilepſiæ dolorificæ periodus.*	——— of painful epilepſy.
5. *Convulſionis dolorificæ periodus.*	——— of painful convulſion.
6. *Tuſſis periodicæ periodus.*	——— of periodic cough.

7. *Catameniæ periodus.*	Periods of catamenia.
8. *Hæmorrhoidis periodus.*	——— of the piles.
9. *Podagræ periodus.*	——— of the gout.
10. *Eryſipelatis periodus.*	——— of eryſipelas.
11. *Febrium periodus.*	——— of fevers.

ORDO III.

Retrograde Aſſociate Motions.

GENUS I.

Catenated with Irritative Motions.

SPECIES.

1. *Diabætes irritata.*	Diabetes from irritation.
2. *Sudor frigidus in aſthmate.*	Cold ſweat in aſthma.
3. *Diabætes a timore.*	Diabetes from fear.
4 *Diarrhœa a timore.*	Diarrhœa from fear.
5. *Pallor et tremor a timore.*	Paleneſs and trembling from fear.
6. *Palpitatio cordis a timore.*	Palpitation of the heart from fear.
7. *Abortio a timore.*	Abortion from fear.
8. *Hyſteria a timore.*	Hyſterics from fear.

GENUS II.

Catenated with Senſitive Motions.

SPECIES.

1. *Nauſea idealis.*	Nauſea from ideas.
2. ——-- *a conceptu.*	Nauſea from conception.
3. *Vomitio vertiginoſa.*	Vomiting from vertigo.
4. ——-- *a calculo in uretere.*	——- from ſtone in the ureter.
5. ——-- *ab inſultu paralytico.*	——- from ſtroke of palſy.
6. ——- *a titilatione faucium.*	Vomiting from tickling the throat.
7. ——- *cute ſympathetica.*	——-- from ſympathy with the ſkin.

GENUS III.

Catenated with voluntary Motions.

SPECIES.

1. *Ruminatio.*	Rumination.
2. *Vomitio voluntaria.*	Voluntary vomiting.
3. *Eructatio voluntaria.*	——— eructation.

GENUS IV.

Catenated with external Influences.

SPECIES.

1. *Catarrhus periodicus.*	Periodical catarrh.
2. *Tuſſis periodica.*	Periodic cough.
3. *Hyſteria a frigore.*	Hyſterics from cold.
4. *Nauſea pluvialis.*	Sickneſs againſt rain.

CLASS

CLASS IV.

DISEASES OF ASSOCIATION.

ORDO I.

Increaſed Aſſociate Motions.

GENUS I.

Catenated with Irritative Motion.

The importance of the ſubſequent claſs not only conſiſts in its elucidating all the ſympathetic diſeaſes, but in its opening *a road to the knowledge of fever.* The difficulty and novelty of the ſubject muſt plead in excuſe for the preſent imperfect ſtate of it. The reader is entreated previouſly to attend to the following circumſtances for the greater facility of inveſtigating their intricate connections; which I ſhall enumerate under the following heads.

A. Aſſociate motions diſtinguiſhed from catenations.
B. Aſſociate motions of three kinds.
C. Aſſociations affected by external influences.
D. Aſſociations affected by other ſenſorial motions.
E. Aſſociations catenated with ſenſation.
F. Direct and reverſe ſympathy.
G. Aſſociations affected four ways.
H. Origin of aſſociations.
I. Of the action of vomiting.
K. Tertian aſſociations.

A. *Aſſociate Motions diſtinguiſhed from Catenations.*

Aſſociate motions properly mean only thoſe, which are cauſed by the ſenſorial power of aſſociation. Whence it appears, that thoſe fibrous motions, which conſtitute the introductory link of an aſſociate train of motions, are excluded from this definition, as not being themſelves cauſed by the ſenſorial power of aſſociation, but by irritation, or ſenſation, or volition. I ſhall give for example the fluſhing of the face after dinner; the capillary veſſels of the face increaſe their actions in conſequence of their catenation, not their aſſociation, with thoſe of the ſtomach; which latter are cauſed to act with greater energy by the irritation excited by the ſtimulus of food. Theſe capillaries of the face are aſſociated with each other reciprocally, as being all of them excited by the ſenſorial power of aſſociation; but they are only catenated with thoſe of the ſtomach, which are not in this caſe aſſociate motions but irritative ones. The common uſe of the word aſſociation for almoſt every kind of connection has rendered this ſubject difficult; from which inaccuracy I fear ſome parts of this work are not exempt.

B. *Aſſociate Motions of three Kinds.*

Thoſe trains or tribes of aſſociate motions, whoſe introductory link conſiſts of an irritative motion, are termed irritative aſſociations; as when the muſcles of the eyelids cloſe the eye in common nictitation. Thoſe, whoſe introductory link conſiſts of a ſenſitive motion, are termed ſenſitive aſſociations; as when the pectoral and intercoſtal muſcles act in ſneezing. And laſtly, thoſe, whoſe introductory link conſiſts of a voluntary motion, are termed voluntary aſſociations; as when the muſcles of the lower limbs act in concert with thoſe of the arm in fencing.

C. *Aſſociations affected by external Influences.*

Circles of aſſociate motions, as well as trains and tribes of them, are liable to be affected by external influences, which conſiſt of ethereal fluids, and which, by penetrating the ſyſtem, act upon it perhaps rather as a cauſa ſine quâ non of its movements, than directly as a ſtimulus; except when they are accumulated in unuſual quantity. We have a ſenſe adapted to the perception of the exceſs or defect of one of theſe fluids; I mean that of elementary heat; in which all things are immerſed. See Claſs IV. 1. 4. 1. But there are others of them, which as we have no power to evade their influence, ſo we have no ſenſe to perceive it; theſe are the ſolar, and lunar, and terreſtrial gravitation, in which alſo all things are immerſed; the electric aura, which pervades us, and is perpetually varying, See Claſs IV. 1. 4. 5; the magnetic fluid, Claſs IV. 1. 4. 6; and laſtly, the great life-preſerver oxygen gas, and the aqueous vapour of the atmoſphere, ſee Claſs IV. 1. 4. 6. and 7. and 2.

Of theſe external influences thoſe of heat, and of gravity, have diurnal periods of increaſe and decreaſe; beſides their greater periods of monthly or annual variation. The manner in which they act by periodical increments on the ſyſtem, till ſome effect is produced, is ſpoken of in Sect. XXXII. 3. and 6.

D. *Aſſociations affected by other Senſorial Motions.*

Circles and trains of aſſociate motions are alſo liable to be affected by their catenations with other ſenſorial powers, as of irritation, or ſenſation, or volition; which other ſenſorial powers either thus ſimply form ſome of the links of the catenation, or add to the energy of the aſſociated motions. Thus when vomiting is cauſed by the ſtimulus of a ſtone in the ureter, the ſenſation of pain ſeems to be a link of the catenation rather than an efficient cauſe of the vomiting. But when the capillary veſſels of the ſkin increaſe their action from the influence of external heat, they are excited both by the ſtimulus of unuſual heat, as well as by the ſtimulus of the blood, and by their accuſtomed aſſociation with the actions of the heart and arteries. And laſtly, in the bluſh of anger the ſenſorial power of volition is added to that of aſſociation, and irritation, to excite the capillaries of the face with increaſed action. See Claſs IV. 2. 3. 5.

E. *Aſſociations catenated with Senſation.*

Pain frequently accompanies aſſociate trains or circles of motion without its being a cauſe, or a link, of them, but ſimply an attendant ſymptom; though it frequently gives name to the diſeaſe, as head-ach. Thus in the cramp of the calves of the legs in diarrhœa,

rhœa, the increaſed ſenſorial power of aſſociation is the proximate cauſe; the preceding increaſed action of the bowels is the remote cauſe; and the proximate effect is the violent contractions of the muſculi gaſtrocnemii; but the pain of theſe muſcles is only an attendant ſymptom, or a remote effect. See Sect. XVIII. 15. Other ſenſitive aſſociations are mentioned in Claſs IV. 1. 2. and IV. 1. 2. 15.

Thus, if the fluſhing of the face above mentioned after dinner be called a diſeaſe, the immediate or proximate cauſe is the increaſed power of aſſociation, the remote cauſe is the increaſed irritative motions of the ſtomach in conſequence of the ſtimulus of food and wine. The diſeaſe or proximate effect conſiſts in the increaſed actions of the cutaneous veſſels of the face; and the ſenſation of heat, the exiſtence of heat, and the red colour, are attendants or ſymptoms, or remote effects, of the increaſed actions of theſe cutaneous veſſels.

F. *Direct aud reverſe Sympathy.*

The increaſed actions of the primary part of the trains of aſſociated motions are ſometimes ſucceeded by increaſed actions of the ſecondary part of the train; and ſometimes by decreaſed actions of it. So likewiſe the decreaſed actions of the primary part of a train of aſſociate motions are ſometimes ſucceeded by decreaſed actions of the ſecondary part, and ſometimes by increaſed actions of it. The former of theſe ſituations is called direct ſympathy, and the latter reverſe ſympathy. In general I believe, where the primary part of the train of aſſociated motions is exerted more than natural, it produces direct ſympathy in ſtrong people, and reverſe ſympathy in weak ones, as a full meal makes ſome people hot, and others chill. And where the primary part of the train is exerted leſs than natural, it produces direct ſympathy in weak people, and reverſe ſympathy in ſtrong ones, as on being expoſed for a certain length of time on horſeback in a cold day gives indigeſtion and conſequent heart-burn to weak people, and ſtrengthens the digeſtion, and induces conſequent hunger, in ſtrong ones. See Sect. XXXV. 1.

This may perhaps be more eaſily underſtood, by conſidering ſtrength and weakneſs, when applied to animal bodies, as conſiſting in the quantity of ſenſorial power reſiding in the contracting fibres, and the quantity of ſtimulus applied, as ſhewn in Sect. XII. 2. 1. Now when defective ſtimulus, within certain limits, is partially applied to parts ſubject to perpetual motion, the expenditure of ſenſorial power is for a while leſſened, but not its general production in the brain, nor its derivation into the weakly-ſtimulated part. Hence in ſtrong people, or ſuch whoſe fibres abound with ſenſorial power, if the firſt tribe of an aſſociate train of motions be deprived in part of its accuſtomed ſtimulus, its action becomes diminiſhed; and the ſenſorial power becomes accumulated, and by its ſuperabundance, or overflowing as it were, increaſes the action of the ſecond tribe of the aſſociate actions by reverſe ſympathy. As expoſing the warm ſkin for a moderate time to cold air increaſes the action of the ſtomach, and thus ſtrengthens the power of digeſtion.

On the reverſe, when additional ſtimulus within certain limits is partially applied to parts, which are deficient in reſpect to the natural quantity of ſenſorial power, the expenditure of ſenſorial power is increaſed, but in a leſs degree than the increaſed production of it in the brain, or its increaſed derivation into the ſtrongly-ſtimulated organ. Hence in weak people, or ſuch whoſe fibres are deficient of ſenſorial power, if the firſt tribe of an aſſociate train of motions be ſubjected for a while to greater ſtimulus than uſual, a greater production of ſenſorial power, or a greater derivation of it into the ſtimulated parts occurs; which by its exceſs, or overflowing as it were, increaſes the actions of the ſecond tribe of the aſſociate motions by direct ſympathy. Thus when vomiting occurs with cold extremities, a bliſter on the back in a few hours occaſions univerſal warmth of the ſkin, and ſtops the vomiting. And when a diarrhœa occurs with pale ſkin and cold extremities, the pricking of the points of a flannel ſhirt, worn next the ſkin, occaſions univerſal warmth of it, and checks or cures the diarrhœa.

In ſome aſſociate trains of action nevertheleſs reverſe ſympathies more frequently occur than direct ones, and in others direct ones more frequently than reverſe ones. Thus in continued fever with debility there appears to be a reverſe ſympathy between the capillary veſſels of the ſtomach and thoſe of the ſkin; becauſe there exiſts a total averſion to ſolid food, and conſtant heat on the ſurface of the body. Yet theſe two ſyſtems of veſſels are at other times actuated by direct ſympathy, as when paleneſs attends ſickneſs, or cold feet induces indigeſtion. This ſubject requires to be further inveſtigated, as it probably depends not only on the preſent or previous plus or minus of the ſenſorial power of aſſociation, but alſo on the introduction of other kinds of ſenſorial power, as in Claſs IV. 1. 1. D; or the increaſed production of it in the brain, or the greater mobility of one part of a train of actions than another.

Thus when much food or wine is taken into the ſtomach, if there be no ſuperfluity of ſenſorial power in the ſyſtem, that is, none to be ſpared from the continual actions of it, a paleneſs and chillneſs ſucceeds for a time; becauſe now the expenditure of it by the increaſed actions of the ſtomach is greater than the preſent production of it. In a little time however the ſtimulus of the food and wine increaſes the production of ſenſorial power in the brain, and this produces a ſuperfluity of it in the ſyſtem; in conſequence of which the ſkin now becomes warm and florid, which was at firſt cold and pale; and thus the reverſe ſympathy is ſhortly converted into a direct one; which is probably owing to the introduction of a ſecond ſenſorial power, that of pleaſurable ſenſation.

On the contrary, when an emetic drug produces ſickneſs, the ſkin is at firſt pale for a time by direct ſympathy with the capillaries of the ſtomach; but in a few minutes, by the accumulation of ſenſorial power in the ſtomach during its leſs active ſtate in ſickneſs, the capillaries of the ſkin, which are aſſociated with thoſe of the ſtomach, act with greater energy by reverſe ſympathy, and a florid colour returns. Where the quantity of action is diminiſhed in the firſt part of a train of motions, whether by previous diminution of ſenſorial power, or preſent diminution of ſtimulus, the ſecond part of the train becomes torpid by direct ſympathy. And when the quantity of action of the firſt part becomes increaſed by the accumulation of ſenſorial power during its previous torpor, or by increaſe of ſtimulus, the actions of the ſecond part of it likewiſe become increaſed by direct ſympathy.

In moderate hunger the ſkin is pale, as before dinner, and in moderate ſickneſs, as no great accumulation of ſenſorial power has commenced; but in violent hunger, and in greater torpor of the ſtomach, as from contagious matter, the accumulation of ſenſorial power becomes ſo great as to affect the arterial and capillary ſyſtem, and fever is produced in both caſes.

In contagious fevers with arterial debilities commencing with torpor of the ſtomach, why is the action of the heart weakened, and that of the capillaries increaſed? Is it becauſe the mobility of the heart is leſs than that of the ſtomach, and the mobility of the capillaries greater? Or is it becauſe the aſſociation between the muſcular fibres of the ſtomach and thoſe of the heart have been uniformly aſſociated by direct

ſympathy;

ſympathy; and the capillaries of the ſtomach and thoſe of the ſkin have been more frequently aſſociated by reverſe ſympathy?

Where the actions of the ſtomach have been previouſly exhauſted by long ſtimulus, as on the day after intoxication, little or no accumulation of ſenſorial power occurs, during the torpor of the organ, beyond what is required to replace the deficiency of it, and hence fever ſeldom follows intoxication. And a repetition of the ſtimulus ſometimes becomes neceſſary even to induce its natural action, as in dram-drinkers.

Where there has been no previous exhauſtion of ſenſorial power, and the primary link of aſſociate motions is violently actuated by the ſenſorial power of ſenſation, the ſecondary link is alſo violently actuated by direct ſympathy, as in inflammatory fevers. Where however the ſenſorial power of the ſyſtem is leſs than natural, the ſecondary link of aſſociated motions becomes torpid by reverſe ſympathy, as in the inoculated ſmall-pox during the eruption on the face the feet are frequently cold.

G. *Aſſociations affected four Ways.*

Hence aſſociated trains or circles of motions may be affected four different ways. 1. By the greater or leſs energy of action of the firſt link with which they are catenated, and from which they take their names; as irritative, ſenſitive, or voluntary aſſociations. 2. By being excited by two or more ſenſorial powers at the ſame time, as by irritation and aſſociation, as in the inſtance of the application of the ſtimulus of increaſed external heat to the cutaneous capillaries. 3. By catenation with other ſenſorial powers, as with pain or pleaſure, which are in this caſe not the proximate cauſe of motion, but which, by becoming a link of catenation, excites the ſenſorial power of aſſociation into action; as the pain at the neck of the gall-bladder occaſioned by a gall-ſtone is transferred to the other end of that canal, and becomes a link of catenation between the action of the two extremities of it. 4. The influence of ethereal fluids, as of heat and gravitation. To which laſt perhaps might be added moiſture and oxygen gas as conſtituting neceſſary parts of the ſyſtem, rather than ſtimuli to excite it into action.

II. *The Origin of Aſſociations.*

Some trains or circles of aſſociate motions muſt have been formed before our nativity, as thoſe of the heart, arteries, and capillaries; others have been aſſociated, as occaſion required them, as the muſcles of the diaphragm and abdomen in vomiting; and others by perpetual habit, as thoſe of the ſtomach with the heart and arteries directly, as in weak pulſe during ſickneſs; with the capillaries directly, as in the fluſhed ſkin after dinner; and laſtly, with the cellular abſorbents reverſely, as in the increaſed abſorption in anaſarca during ſickneſs; and with the irritative motions of the organs of ſenſe reverſely, as in vertigo, or ſea-ſickneſs. Some of theſe aſſociations ſhall be here ſhortly deſcribed to facilitate the inveſtigation of others.

Firſt,

Firſt, other congeries of glands occupy but a particular part of the ſyſtem, or conſtitute a particular organ, as the liver, or kidneys; but thoſe glands, which ſecrete the mucus, and perſpirable matter, which are called capillaries, are of very great extent; they receive the blood from the arteries, ſeparate from it the mucus, which lines every cell, and covers every cavity of the body; and the perſpirable matter, which ſoftens and lubricates the whole ſurface of the ſkin, and the more extenſive ſurface of the air-veſſels, which compoſe the lungs. Theſe are ſupplied with blood by the perpetual action of the heart and arteries, and have therefore their motions aſſociated with the former, and with each other, by ſympathy, which is ſometimes direct, and ſometimes reverſe.

One branch of this aſſociation, the capillaries of the ſkin, are very irritable by the increaſed quantities of cold and heat, another branch, that of the lungs, has not the perception of cold and heat, but is liable by direct ſympathy to act in concert with the former, as in going into the cold bath. And it is probable the capillaries of the internal membranes are likewiſe directly affected by their ſympathy with thoſe of the ſkin, as appears from the defect of ſecretion in ulcers during the cold fits of agues.

The motions of this extenſive ſyſtem of capillaries, thus aſſociated by direct ſympathy, are alſo aſſociated with thoſe of the heart and arteries, ſometimes by reverſe and ſometimes by direct ſympathy; and thus conſtitute ſimple fever. The cold paroxyſm of which conſiſts in their torpor, and the hot one in their orgaſm, or increaſed activity.

I. *Of the Action of Vomiting.*

The manner, in which the ſtomach and the diaphragm and abdominal muſcles acquire their aſſociate action in vomiting, requires ſome attention. It is not probable, that this action of vomiting occurs before nativity; as the uniform application of the nutritive liquor amnii to the mouth of the fœtus, and the uniform expenditure of its nouriſhment, would not ſeem to give occaſion to too great temporary repletion of the ſtomach; and would preclude the deglutition of any improper material. After nativity the ſtomach of the child may be occaſionally too much diſtended with milk; as previous hunger may induce it to overgorge itſelf; and by repeated efforts the act of vomiting is learned, as a means of getting free from a diſagreeable ſenſation. Thus when any diſguſtful material, as a bitter drug, is taken into the mouth; certain retrograde motions of the tongue and lips are produced, for the purpoſe of putting the diſagreeable material out of the mouth again.

When the ſtomach is diſagreeably ſtimulated by the diſtention or acrimony of the aliment, a ſimilar effort to regurgitate it muſt occur; and by repeated trials the action of the diaphragm and abdominal muſcles by ſqueezing the ſtomach aſſiſts its retrograde exertion to diſgorge its contents. In the ſame manner when a piece of gravel is puſhed into the urethra, or a piece of indurated bile into the neck of the gall-bladder, after they have been in vain preſſed forward by the uſual motions of thoſe ducts, they return into the bladders of gall and urine by the retrograde motions of them.

That this is one mode, in which vomiting is induced, appears from the inſtantaneous rejection from the ſtomach occaſioned by ſome nauſeous drug, or from ſome nauſeous idea; and laſtly, from the voluntary power, which ſome people have been ſaid to have acquired, of emptying their ſtomachs, much in the ſame manner as ruminating animals bring up the graſs from their firſt ſtomach.

There are nevertheleſs many modes by which theſe inverted motions of the ſtomach and œſophagus are induced, and which it is of conſequence to diſtinguiſh from each other. The firſt is the mode above deſcribed, where an effort is made to diſlodge ſomething, which ſtimulates the ſtomach into diſagreeable ſenſation; and which is returned by repeated exertions; as when a nauſeous drug is taken into the mouth, or a bit of ſand falls into the eye, or a drop of water into the wind-pipe. In this the periſtaltic motions of the ſtomach are firſt ſtopped, and then reverted by painful ſenſation; and the abdominal muſcles and diaphragm by repeated efforts become aſſociated with them. Now as leſs ſenſorial power is expended on the retrograde actions of the ſtomach, and of the lymphatics, which open their mouths on its ſurface, than by their natural motions, an accumulation of ſenſorial power in the fibres of the ſtomach follows the exhibition of an emetic, and on that account an emetic will ſometimes ſtop a ſpontaneous vomiting which was owing to ſenſorial deficiency. See Sect. XXXV. 1. 3. and Art. V. 2. 1.

As bitters and metallic ſalts, exhibited in ſmall doſes, ſtimulate the ſtomach into greater action, as appears by their increaſing the power of digeſtion, and yet become emetic, when given in larger doſes; one might ſuſpect, that they became emetic by inducing debility, and conſequent retrograde actions of the ſtomach, by their previouſly exhauſting the ſenſorial power by their great ſtimulus; which might be effected in a moment without producing pain, and in conſequence without our perceiving it. But on the contrary, there does not in general appear on the exhibition of emetics to be any previous exhauſtion of ſenſorial power; becauſe there is evidently an accumulation of it during the ſickneſs, as appears from the digeſtion being ſtronger afterwards; and from the increaſed action of the cellular and cutaneous abſorbents during its operation. See Art. V. 2. 1.

Another mode, by which vomiting is induced, is owing to debility or deficiency of ſenſorial power, from the previous exhauſtion of it; as on the day after intoxication, or which occurs in people enfeebled with the gout, and in dropſy, and in ſome fevers with debility. In theſe, when the vomiting ceaſes, there is no appearance of accumulation of ſenſorial power, as the digeſtion ſtill remains weak and imperfect.

Another mode by which ſickneſs or vomiting is induced, is by defect of ſtimulus, as in great hunger; and in thoſe, who have been habituated to ſpice and ſpirit with their meals, who are liable to be ſick after taking food without theſe additional ſtimuli. Other means of inducing ſickneſs by vertigo, or by nauſeous ideas, will be mentioned below.

We ſhall only add, that the motions of the muſcular fibres of the ſtomach are aſſociated with thoſe of the heart and arteries by direct ſympathy, as appears by the weakneſs of the pulſe during the exhibition of an emetic; and that the abſorbents of the ſtomach are aſſociated with the cellular and cutaneous abſorbents by reverſe ſympathy, as is ſhewn by the great abſorption of the mucus of the cells in anaſarca during ſickneſs; at the ſame time that the abſorbents of the ſtomach invert their actions, and pour the mucus and water thus abſorbed into that viſcus.

In cold paroxyſms of fever the ſtomach partakes of the general torpor, and vomiting is induced by its debility, either by its aſſociation with the torpid capillaries, or other torpid parts, or by its own torpor commencing firſt, and cauſing the cold fit. The diſordered motions of the ſtomach frequently ſeem to be the cauſe or primary ſeat of fever, as where contagious miaſmata are ſwallowed with the ſaliva, and where fever is produced by ſea-ſickneſs, which I once ſaw. Nevertheleſs a diſorder of the ſtomach does not always induce fever, as in that caſe it ſhould conſtantly attend indigeſtion, and vergito, and ſea-ſickneſs; but is itſelf frequently induced by aſſociation with the diſordered movements of other parts of the ſyſtem, as when it ariſes from gravel in the ureter, or from a percuſſion on the head.

The connexion of the motions of the ſtomach with irritative ideas, or motions of the organs of ſenſe, in vertigo, is ſhewn in Sect. XX. and thus it appears, that many circles of aſſociation are either directly or reverſely aſſociated, or catenated, with this viſcus; which will much contribute to unfold ſome of the ſymptoms of fever.

K. *Tertian Aſſociations.*

The third link of aſſociate trains of motion is ſometimes actuated by reverſe ſympathy with the ſecond, link, and that by reverſe ſympathy with the firſt link; ſo that the firſt and third link may act by direct ſympathy, and the intermediate one by reverſe ſympathy. Of this inſtances are given in the ſyngultus nephriticus, Claſs IV. 1. 1. 7. and IV. 2. 1. At other times the tertian or quartan links of aſſociate motions are actuated by direct ſympathy; and that ſometimes forwards and ſometimes backwards in reſpect to the uſual order of thoſe trains of aſſociate motions, as in Claſs IV. 1. 2. 1.

SPECIES.

1. *Rubor vultûs pranſorum.* Fluſhing of the face after dinner is explained in Sect. XXXV. 1. In the beginning of intoxication the whole ſkin becomes florid from the aſſociation of the actions of the cutaneous

arteries with thoſe of the ſtomach, becauſe vinous ſpirit excites the fibres of the ſtomach into more violent action than the ſtimulus of common food; and the cutaneous capillaries of the face, from their more frequent expoſure to the viciſſitudes of cold and heat, poſſeſs more mobility or irritability than thoſe of other parts of the ſkin, as further explained in Sect. XXXIII. 2. 10. Vinegar is liable to produce this fluſhing of the face, which probably is owing to the quantity of vinous ſpirit it contains, as I believe the unfermented vegetable acids do not produce this effect. In every kind of bluſh the arterial blood is propelled into the capillaries faſter than the venous abſorption can carry it forwards into the veins, in this reſpect reſembling the tenſio phalli.

Can the beginning vinous or acetous fermentation of the aliment in weak ſtomachs contribute to this effect? or is it to be aſcribed to the greater power of aſſociation between the arteries of the face and the fibres of the ſtomach in ſome people than in others?

M. M. Eat and drink leſs at a time, and more frequently. Put 20 drops of weak acid of vitriol into water to be drank at meals. Let the dreſs over the ſtomach and bowels be looſe. Uſe no fermented liquors, or vinegar, or ſpice.

2. *Sudor ſtragulis immerſorum.* Sweat from being covered in bed. In the commencement of an epidemic fever, in which the perpetual efforts to vomit was a diſtreſſing ſymptom, Dr. Sydenham diſcovered, that

it

if the patient's head was for a ſhort time covered over with the bed clothes, warmth was produced, and a ſweat broke out upon the ſkin, and the tendency to vomit ceaſed. In this curious fact two trains of aſſociated motions are excited into increaſed action. Firſt, the veſſels of the lungs are known to have their motion aſſociated with thoſe of the ſkin by the difficulty of breathing on going into the cold bath, as deſcribed in Sect. XXXII. 3. 2. Hence, when the veſſels of the lungs become excited into ſtronger action, by the bad air under the bed clothes, warmed and adulterated by frequent breathing, thoſe of the external ſkin ſoon become excited by their aſſociation into more energetic action, and generate more heat along with a greater ſecretion of perſpirable matter. Secondly, the ſympathy between the ſtomach and ſkin is evident in variety of circumſtances; thus the cold air of froſty days applied to the ſkin for a ſhort time increaſes the action of the ſtomach by reverſe ſympathy, but decreaſes it if continued too long by direct ſympathy; ſo in the circumſtance above mentioned the action of the ſtomach is increaſed by direct ſympathy with that of the ſkin; and the tendency to vomit, which was owing to its diminiſhed action, ceaſes.

3. *Ceſſatio ægritudinis cute excitatá.* The cure of ſickneſs by ſtimulating the ſkin. This is explained in the preceding article; and further noticed in IV. 2. 2. 4. and in IV. 1. 1. f.

Similar to theſe is the effect of a bliſter on the back in relieving ſickneſs, indigeſtion, and heart-burn; and, on the contrary, by theſe ſymptoms being frequently induced by coldneſs of the extremities. The bliſter ſtimulates the cutaneous veſſels into greater action; whence warmth and pain are produced at the ſame time, and the fibres of the ſtomach are excited into greater action by their aſſociation with thoſe of the ſkin. It does not appear, that the concomitant pain of the bliſter cauſes the increaſed energy of the ſtomach, becauſe the motions of it are not greater than natural; though it is ſometimes difficult to determine, whether the primary part of ſome aſſociated trains be connected with irritative or ſenſitive motions.

In the ſame manner a flannel ſhirt, to one who has not been in the habit of wearing one, ſtimulates the ſkin by its points, and thus ſtops vomiting in ſome caſes; and is particularly efficacious in checking ſome chronical diarrhœas, which are not attended with fever; for the abſorbents of the ſkin are thus ſtimulated into greater action, with which thoſe of the inteſtines conſent by direct ſympathy.

This effect cannot be aſcribed to the warmth alone of the flannel ſhirt, as being a covering of looſe texture, and confining air in its pores, like a ſponge, which air is known to be a bad conductor of heat, ſince in that caſe its uſe ſhould be equally efficacious, if it were worn over a linen ſhirt; and an increaſed warmth of the room of the patient would be equally ſerviceable.

4. *Digeſtio aucta frigore cutaneo.* Digeſtion increaſed by coldneſs of the ſkin. Every one has experienced the increaſe of his appetite after walking in the cool air in froſty days; for there is at this time not only a ſaving of ſenſorial power by the leſs exertion of the cutaneous veſſels; but, as theſe conſent with thoſe of the ſtomach and bowels, this ſaving of ſenſorial power is transferred by reverſe ſympathy from the cutaneous capillaries and abſorbents to thoſe of the ſtomach and inteſtines.

Hence weak people ſhould uſe the cold air of winter as a cold bath; that is, they ſhould ſtay in it but a ſhort time at once, but ſhould immerſe themſelves in it many times a day.

5. *Catarrhus a frigore cutaneo.* Catarrh from cold ſkin. This has been already explained in Claſs I. 1. 2. 7. and is further deſcribed in Sect. XXXV. 1. 3. In this diſeaſe the veſſels of the membrane, which lines the noſtrils, are excited into greater action; when thoſe of the ſkin, with which they are aſſociated, are excited into leſs action by the deficiency of external heat, by reverſe ſympathy; and though the pain of cold attends the torpor of the primary link of this aſſociation, yet the increaſed motions of the membrane of the noſtrils are aſſociated with thoſe of the cutaneous veſſels, and not with the pain of them, becauſe no inflammation follows.

6. *Abſorptio cellularis aucta vomitu.* In the act of vomiting the irritative motions of the ſtomach are

inverted, and of the abſorbents, which open their mouths into it; while the cutaneous, cellular, and pulmonary abſorbents are induced, by reverſe ſympathy with them, to act with greater energy. This is ſeen in caſes of anaſarca, when long ſickneſs and vomiting are cauſed by ſquills, or antimonial ſalts, or moſt of all by the decoction of digitalis purpurea, foxglove; and Mr. J. Hunter mentions a caſe, in which a large bubo, which was juſt ready to break, was abſorbed in a few days by ſickneſs at ſea. Treatiſe on the blood, p. 501, which is thus accounted for; leſs ſenſorial power is expended during ſickneſs by the decreaſed action of the fibres of the ſtomach, and of its abſorbents; as ſhewn in Sect. XXXV. 1. 3. whence an accumulation of it is produced, and there is in conſequence a greater quantity of ſenſorial power for the exertion of thoſe motions, which are aſſociated with the abſorbents of the ſtomach by reverſe ſympathy.

The reverſe ſympathy between the lacteal and lymphatic branches of the abſorbent ſyſtem have been produced by the one branch being leſs excited to act, when the other ſupplies ſufficient fluid or nutriment to the ſanguiferous veſſels. Thus when the ſtomach is full, and the ſupply of chyle and mucus and water is in ſufficient quantity; the pulmonary, cellular, and cutaneous lymphatics are not excited into action; whence the urine is pale, and the ſkin moiſt, from the defect of abſorption on thoſe ſurfaces.

7. *Syngultus nephriticus.* When a ſtone irritates the ureter, and that even without its being attended

with pain or fever, ſometimes a chronical hiccough occurs, and continues for days and weeks, inſtead of ſickneſs or vomiting; which are the common ſymptoms. In this caſe the motions of the ſtomach are decreaſed by their ſympathy with thoſe of the ureter, which are increaſed by the ſtimulus of the ſtone in it; and the increaſed motions of the diaphragm ſeem to exiſt in conſequence of their aſſociation with the ſtomach by a ſecond reverſe ſympathy. This hiccough may nevertheleſs admit of another explanation, and be ſuppoſed to be a convulſive exertion of the diaphragm to relieve the diſagreeable ſenſation of the ſtomach in conſequence of its diſordered irritative aſſociations; and in that caſe it would belong to Claſs III. 1. 1. See Claſs IV. 2. 1. for another example of tertiary aſſociation.

M. M. Veneſection. Emetic. Calomel. Cathartic, opium, oil of cinnamon from two to ten drops. Aerated alkaline water. Peruvian bark.

8. *Febris irritativa.* Irritative fever, deſcribed in Claſs I. 1. 1. 1. The diſeaſes above explained in this genus are chiefly concerning the ſympathies of the abſorbent ſyſtem, or the alimentary canal, which are not ſo much aſſociated with the arterial ſyſtem, as to throw it into diſorder, when they are ſlightly deranged; but when any great congeries of conglomerate glands, which may be conſidered as the extremities of the arterial ſyſtem, are affected with torpor, the whole arterial ſyſtem and the heart ſympathize

thize with the torpid glands, and act with leſs energy; which conſtitutes the cold fit of fever; which is therefore at firſt a decreaſed action of the aſſociate organ; but as this decreaſe of action is only a temporary effect, and an increaſe of exertion both of the torpid glands, and of the whole arterial ſyſtem, ſoon follows; the hot fit of irritative fever, or fever with ſtrong pulſe, properly belongs to this claſs and genus of diſeaſes.

ORDO I.

Increaſed Aſſociate Motions.

GENUS II.

Catenated with Senſitive Motions.

The primary links of the aſſociated actions of this genus are either produced or attended by painful or pleaſurable ſenſation. The ſecondary links of the firſt ten ſpecies are attended with increaſed motions without inflammation, thoſe of the remainder are attended with inflammation. All inflammations, which do not ariſe in the part which was previouſly torpid, belong to this genus; as the gout, rheumatiſm, eryſipelas. It is probable many other inflammations may, by future obſervation, require to be tranſplanted into this claſs.

The circles of ſenſitive aſſociate motions conſiſt chiefly of the excretory ducts of the capillaries and of the mouths of the abſorbent veſſels, which conſtitute the membranes; and which have been induced into action at the ſame time; or they conſiſt of the terminations of canals; or of parts which are endued with greater ſenſibility than thoſe which form the firſt link of the aſſociation. An inſtance of the firſt of thoſe is the ſympathy between the membranes of the alveolar proceſſes of the jaws, and the membranes above or beneath the muſcles about the temples in hemicrania. An inſtance of the ſecond is in the ſympathy between the excretory duct of the lacrymal gland, and the naſal duct of the lacrymal ſac. And an inſtance of the third is the ſympathy between the membranes of the liver, and the ſkin of the face in the gutta roſea of inebriates.

SPECIES.

1. *Lacrymarum fluxus ſympatheticus.* A flow of tears from grief or joy. When the termination of the duct of the lacrymal ſac in the noſtrils becomes affected either by painful or pleaſurable ſenſations, in conſequence of external ſtimulus, or by its aſſociation with agreeable or diſagreeable ideas, the motions of the lacrymal gland are at the ſame time exerted with greater energy, and a profuſion of tears ſucceeds by ſenſitive aſſociation, as explained in Sect. XVI. 8. 2.

In this caſe there exiſts a chain of aſſociated actions, the ſecretion of the lacrymal gland is increaſed by whatever ſtimulates the ſurface of the eye, at the ſame time the increaſed abundance of tears ſtimulates the puncta lacrymalia into greater action; and the fluid thus abſorbed ſtimulates the lacrymal ſac, and its naſal duct in the noſe into greater action. In a contrary direction of this chain of aſſociation the preſent increaſe of action is induced. Firſt, the naſal duct of the lacrymal ſac is excited into increaſed action by ſome pleaſurable or painful idea, as deſcribed in Sect. XVI. 8. 2. 2d. The puncta lacrymalia or other extremity of the lacrymal ſac ſympathizes with it (as the two ends of all other canals ſympathize with each other). 3d. With theſe increaſed motions of the puncta lacrymalia thoſe of the excretory duct of the lacrymal gland are aſſociated from their having ſo perpetually acted together. And, laſtly, with the increaſed actions of the excretory duct of this gland are aſſociated thoſe of the other end of it by their frequently acting together; in the ſame manner as the extremities of other canals are aſſociated; and thus a greater flow of tears is poured into the eye.

When a flow of tears is produced in grief, it is believed to relieve the violence of it, which is worthy a further inquiry. Painful ſenſations, when great, excite the faculty of volition; and the perſon continues voluntarily to call up or perform thoſe ideas, which occaſion the painful ſenſation; that is, the afflicted perſon becomes ſo far inſane or melancholy; but tears are produced by the ſenſorial faculty of aſſociation, and ſhew that the pain is ſo far relieved as not to excite the exceſſive power of volition, or inſanity, and are therefore a ſign of the abatement of the painful ſtate of grief, rather than a cauſe of that abatement. See Claſs III. 1. 2. 10.

2. *Sternutatio a lumine.* Some perſons ſneeze from looking up at the light ſky in a morning after coming out of a dark bed-room. The olfactory nerves are brought into too great action by their ſympathy with the optic nerves, or by their reſpective ſympathies with ſome intervening parts, as probably with the two extremities of the lacrymal ſac; that is, with the puncta lacrymalia and the naſal duct. See Claſs II. 1. 1. 3.

3. *Dolor dentium ſtridore.* Tooth-edge from grating ſounds, and from the touch of certain ſubſtances, and even from imagination alone, is deſcribed and explained in Sect. XVI. 10. The increaſed actions of the alveolar veſſels or membranes are aſſociated with the ideas, or ſenſual motions of the auditory nerves in the firſt caſe; and of thoſe of the ſenſe of touch, in the ſecond caſe; and by imagination, or ideas exerted of painful ſenſation alone, in the laſt.

4. *Riſus ſardonicus.* A diſagreeable ſmile attends inflammations of the diaphragm ariſing from the aſſociations of the reiterated exertions of that muſcle with thoſe of the lips and cheeks in laughing. See Diaphragmitis, Claſs II. 1. 2. 6.

5. *Salivæ fluxus cibo viſo.* The flow of ſaliva into the mouths of hungry animals at the ſight or ſmell of

food is ſeen in dogs ſtanding round a dinner-table. The increaſed actions of the ſalivary glands have been uſually produced by the ſtimulus of agreeable food on their excretory ducts during the maſtication of it; and with this increaſed action of their excretory ducts the other terminations of thoſe glands in the capillary arteries have been excited into increaſed action by the mutual aſſociation of the ends of canals; and at the ſame time the pleaſurable ideas, or ſenſual motions, of the ſenſe of ſmell and of ſight have accompanied this increaſed ſecretion of ſaliva. Hence this chain of motions becomes aſſociated with thoſe viſual or olfactory ideas, or with the pleaſure, which produces or attends them.

6. *Tenſio mammularum viſo puerulo.* The nipples of lacteſcent women are liable to become turgid at the ſight of their young offspring. The nipple has generally been rendered turgid by the titillation of the lips or gums of the child in giving ſuck; the viſible idea of the child has thus frequently accompanied this pleaſurable ſenſation of parting with the milk, and turgeſcence of the tubes, which conſtitute the nipple. Hence the viſual idea of the child, and the pleaſure which attends it, become aſſociated with thoſe increaſed arterial actions, which ſwell the cells of the mammula, and extend its tubes; which is very ſimilar to the tenſio phalli viſâ muliere nudâ etiam in inſomnio.

7. *Tenſio penis in hydrophobia.* An erection of the penis occurs in the hydrophobia, and is a troubleſome

ſymptom, as obſerved by Cœlius Aurelianus, Fothergill, and Vaughn, and would ſeem to be produced by an unexplained ſympathy between the ſenſations about the fauces and the penis. In men the hair grows about both theſe parts, the voice changes, and the neck thickens at puberty. In the mumps, when the ſwellings about the throat ſubſides, the teſticles are liable to ſwell. Venereal infection received by the penis is very liable to affect the throat with ulcers. Violent coughs, with ſoreneſs or rawneſs about the fauces are often attended with erection of the penis; which is alſo ſaid to happen to male animals, that are hanged; which laſt circumſtance has generally been aſcribed to the obſtruction of the circulation of the blood, but is more probably occaſioned by the ſtimulus of the cord in compreſſing the throat; ſince if it was owing to impeded circulation it ought equally to occur in drowning animals.

In men the throat becomes ſo thickened at the time of puberty, that a meaſure of this is uſed to aſcertain the payment of a poll-tax on males in ſome of the iſlands of the Mediterranean, which commences at puberty; a ſtring is wrapped twice round the thinneſt part of the neck, the ends of it are then put one into each corner of the mouth; and if, when thus held in the teeth, it paſſes readily over the head, the ſubject is taxable.

It is difficult to point out by what circumſtance the ſenſitive motions of the penis and of the throat and noſe become aſſociated; I can only obſerve, that theſe parts are ſubjected to greater pleaſurable ſenſations than any other parts of the body; one being deſigned to preſerve ourſelves by the pleaſure attending the ſmell and deglutition of food, and the other to enſure the propagation of our ſpecies; and may thus gain an aſſociation of their ſenſitive motion by their being eminently ſenſible to pleaſure, See Claſs I. 3. 1. 11. and III. 1. 1. 15. and Sect. XVI. 5.

In the female ſex this aſſociation between the face, throat, noſe, and pubis does not exiſt; whence no hair grows on their chins at the time of puberty, nor do their voices change, or their necks thicken. This happens probably from there being in them a more exquiſite ſenſitive ſympathy between the pubis and the breaſts. Hence their breaſts ſwell at the time of puberty, and ſecrete milk at the time of parturition. And in the parotitis, or mumps, the breaſts of women ſwell, when the tumor of the parotitis ſubſides. See Claſs I. 1. 2. 15. Whence it would appear, that their breaſts poſſeſs an intermediate ſympathy between the pubis and the throat; as they are the ſeat of a paſſion, which men do not poſſeſs, that of ſuckling children.

8. *Teneſmus calculoſus.* The ſphincter of the rectum becomes painful or inflamed from the aſſociation of its ſenſitive motions with thoſe of the ſphincter of the bladder, when the latter is ſtimulated into violent pain or inflammation by a ſtone.

9. *Polypus narium ex aſcaridibus?* The ſtimulation of aſcarides in the rectum produces by ſenſitive ſympathy an itching of the noſe, as explained in IV. 2. 2. 6; and in three children I have ſeen a polypus in the noſe, who were all affected with aſcarides; to the perpetual ſtimulation of which, and the conſequent ſenſitive aſſociation, I was led to aſcribe the inflammation and thickening of the membrane of the noſtrils.

10. *Crampus ſurarum in cholera.* A cramp of the muſcles of the legs occurs in violent diarrhœa, or cholera, and from the uſe of too much acid diet in gouty habits. This ſeems to ſympathize with uneaſy ſenſation in the bowels. See Claſs III. 1. 1. 14. This aſſociation is not eaſily accounted for, but is analogous in ſome degree to the paralyſis of the muſcles of the arms in colica ſaturnina. It would ſeem, that the muſcles of the legs in walking get a ſympathy with the lower parts of the inteſtines, and thoſe of the arms in variety of employment obtain a ſympathy with the higher parts of them. See Cholera and Ileus.

11. *Zona ignea nephritica.* Nephritic ſhingles. The external ſkin about the loins and ſides of the belly I ſuppoſe to have greater mobility in reſpect to ſenſitive aſſociation, than the external membrane of the kidney; and that their motions are by ſome unknown means thus aſſociated. When the torpor or beginning inflammation of this membrane ceaſes, the external ſkin becomes inflamed in its ſtead, and a kind

of herpes, called the ſhingles, covers the loins and ſides of the belly. See Claſs II. 1. 5. 9.

12. *Eruptio variolarum.* After the inflammation of the inoculated arm has ſpread for a quarter of a lunation, it affects the ſtomach by reverſe ſympathy; that is, the actions of the ſtomach are aſſociated with thoſe of the ſkin; and as much ſenſorial power is now exerted on the inflamed ſkin, the other part of this ſenſitive aſſociation is deprived of its natural ſhare, and becomes torpid, or inverts its motions. After this torpor of the ſtomach has continued a time, and much ſenſorial power is thus accumulated; other parts of the ſkin, which are alſo aſſociated with it, as that of the face firſt, are thrown into partial inflammation; that is, the eruptions of the ſmall-pox appear on the face.

For that the variolous matter affects the ſtomach previous to its eruption on the ſkin appears from the ſickneſs at the commencement of the fever; and becauſe, when the morbid motions affect the ſkin, thoſe of the ſtomach ceaſe; as in the gout and eryſipelas, mentioned below. The conſent between the ſtomach and the ſkin appears in variety of other diſeaſes; and as they both conſiſt of ſurfaces, which abſorb and ſecrete a quantity of moiſture, their motions muſt frequently be produced together or in ſucceſſion; which is the foundation of all the ſympathies of animal motions, whether of the irritative, ſenſitive, or voluntary kinds.

Now as the ſkin, which covers the face, is expoſed to greater variations of heat and cold than any other part of the body; it probably poſſeſſes more mobility to ſenſitive aſſociations, not only than the ſtomach, but than any other part of the ſkin; and is thence affected at the eruption of the ſmall-pox with violent action and conſequent inflammation, by the aſſociation of its motions with thoſe of the ſtomach, a day before the other parts of the ſkin; and becomes fuller of puſtules, than any other part of the body. See Claſs II. 1. 3. 9.

It might be ſuppoſed, that the ſucceſſive ſwelling of the hands, when the face ſubſides, at the height of the ſmall-pox, and of the feet, when the hands ſubſide, were governed by ſome unknown aſſociations of thoſe parts of the ſyſtem; but theſe ſucceſſions of tumor and ſubſidence more evidently depend on the times of the eruption of the puſtules on thoſe parts, as they appear a day ſooner on the face than on the hands, and a day ſooner on the hands than on the feet, owing to the greater comparative mobility of thoſe parts of the ſkin.

13. *Gutta roſea ſtomatica.* Stomatic red face. On drinking cold water, or cold milk, when heated with exerciſe, or on eating cold vegetables, as raw turnips, many people in harveſt-time have been afflicted with what has been called a ſurfeit. The ſtomach becomes painful, with indigeſtion and flatulency, and after a few days an eruption of the face appears, and con-

tinues with ſome relief, but not with entire relief; as both the pimpled face and indigeſtion are liable to continue even to old age.

M. M. Veneſection. A cathartic with calomel. Then half a grain of opium twice a day for many weeks. If ſaturated ſolution of arſenic three or five drops twice or thrice a day for a week?

14. *Gutta roſea hepatica.* The roſy drop of the face of ſome drinking people is produced like the gout deſcribed below, in conſequence of an inflamed liver. In theſe conſtitutions the ſkin of the face being expoſed to greater variation of heat and cold than the membranes of the liver, poſſeſſes more mobility than thoſe hepatic membranes; and hence by whatever means theſe membranes are induced to ſympathize, when this ſenſitive aſſociation occurs, the cutaneous veſſels of the face run into greater degrees of thoſe motions, which conſtitute inflammation, than previouſly exiſted in the membranes of the liver; and then thoſe motions of the liver ceaſe. See Claſs II. 1. 4. 6.

An inflammation of the liver ſo frequently attends the great potation of vinous ſpirit, there is reaſon to ſuſpect, that this viſcus itſelf becomes inflamed by ſenſitive aſſociation with the ſtomach; or that, when one termination of the bile-duct, which enters the duodenum is ſtimulated violently, the other end may become inflamed by ſenſitive aſſociation.

15. *Podagra.* The gout, except when it affects the liver or ſtomach, ſeems always to be a ſecondary diſeaſe, and, like the rheumatiſm and eryſipelas mentioned below, begins with the torpor of ſome diſtant part of the ſyſtem.

The moſt frequent primary ſeat of the gout I ſuppoſe to be the liver, which is probably affected with torpor not only previous to the annual paroxyſms of the gout, but to every change of its ſituation from one limb to another. The reaſons, which induce me to ſuſpect the liver to be firſt affected, are not only becauſe the jaundice ſometimes attends the commencement of gout, as deſcribed in Sect. XXIV. 2. 8. but a pain alſo over the pit of the ſtomach, which I ſuppoſe to be of the termination of the bile-duct in the duodenum, and which is erroneouſly ſuppoſed to be the gout of the ſtomach, with indigeſtion and flatulency, generally attends the commencement of the inflammation of each limb. See Arthritis ventriculi, Claſs I. 2. 4. 6. In the two caſes, which I ſaw, of the gout in the limbs being preceded by jaundice, there was a cold ſhivering fit attended the inflammation of the foot, and a pain at the pit of the ſtomach; which ceaſed along with the jaundice, as ſoon as the foot became inflamed. This led me to ſuſpect, that there was a torpor of the liver, and perhaps of the foot alſo, but nevertheleſs the liver might alſo in this caſe be previouſly inflamed, as obſerved in Sect. XXIV. 2. 8.

Now as the membranes of the joints of the feet ſuffer greater variations of heat and cold than the membranes of the liver, and are more habituated to extenſion and contraction than other parts of the ſkin in their vicinity; I ſuppoſe them to be more mobile, that is, more liable to run into extremes of exertion or quieſcence; and are thence more ſuſceptible of inflammation, than ſuch parts as are leſs expoſed to great variations of heat and cold, or of extenſion and contraction.

When a ſtone preſſes into the ſphincter of the bladder, the glans penis is affected with greater pain by ſympathy, owing to its greater ſenſibility, than the ſphincter of the bladder; and when this pain commences, that of the ſphincter ceaſes, when the ſtone is not too large, or puſhed too far into the urethra. Thus when the membrane, which covers the ball of the great toe, ſympathizes with ſome membranous part of a torpid or inflamed liver; this membrane of the toe falls into that kind of action, whether of torpor or inflammation, with greater energy, than thoſe actions excited in the diſeaſed liver; and when this new torpor or inflammation commences, that with which it ſympathizes ceaſes; which I believe to be a general law of aſſociated inflammations.

The paroxyſms of the gout would ſeem to be catenated with ſolar influence, both in reſpect to their larger annual periods, and to their diurnal periods—Sect. XXXVI. 3. 6—as the former occur about the ſame ſeaſon of the year, and the latter commence about an hour before ſun-riſe; nevertheleſs the annual periods may depend on the ſucceſſion of great viciſſitudes of cold and heat, and the diurnal ones on our increaſed ſenſibility to internal ſenſations during ſleep, as in the fits of aſthma, and of ſome epilepſies. See Sect. XVIII. 15.

In reſpect to the pre-remote cauſe or diſpoſition to the gout, there can be no doubt of its individually ariſing from the potation of fermented or ſpirituous liquors in this country; whether opium produces the ſame effect in the countries, where it is in daily uſe, I have never been well informed. See Sect. XXI. 10, where this ſubject is treated of; to which I have to add, that I have ſeen ſome, and heard of others, who have moderated their paroxyſms of gout, by diminiſhing the quantity of fermented liquors, which they had been accuſtomed to; and others who, by a total abſtinence from fermented liquors, have entirely freed themſelves from this excruciating malady; which otherwiſe grows with our years, and curtails or renders miſerable the latter half, or third, of the lives of thoſe, who are ſubject to it. The remote cauſe is whatever induces temporary torpor or weakneſs of the ſyſtem; and the proximate cauſe is the inirritability, or defective irritation, of ſome part of the ſyſtem; whence torpor and conſequent inflammation. The great Sydenham ſaw the beneficial effects of abſtinence from fermented liquors in preventing the gout, and adds, "if an empiric could give ſmall-beer "only to gouty patients, as a noſtrum, and perſuade "them not to drink any other ſpirituous fluids, that "he might reſcue thouſands from this diſeaſe, and "acquire a fortune for his ingenuity." Yet it is to be lamented, that this accurate obſerver of diſeaſes had not reſolution to practiſe his own preſcription, and thus to have ſet an example to the world of the truth of his doctrine; but, on the contrary, recommends Madeira, the ſtrongeſt wine in common uſe, to be taken in the fits of the gout, to the detriment of thouſands; and is ſaid himſelf to have periſhed a martyr to the diſeaſe, which he knew how to ſubdue!

As example has more forcible effect than ſimple aſſertion, I ſhall now conciſely relate my own caſe, and that of one of my moſt reſpected friends. E. D. was about forty years of age, when he was firſt ſeized with a fit of the gout. The ball of his right great toe was very painful, and much ſwelled and inflamed, which continued five or ſix days in ſpite of veneſection, a briſk cathartic with ten grains of calomel, and the application of cold air and cold water to his foot. He then ceaſed to drink ale or wine alone; confining himſelf to ſmall beer, or wine diluted with about thrice its quantity of water. In about a year he ſuffered two other fits of the gout, in leſs violent degree. He then totally abſtained from all fermented liquors, not even taſting ſmall-beer, or a drop of any kind of wine; but eat plentifully of fleſh-meat, and all kinds of vegetables, and fruit, uſing for his drink at meals chiefly water alone, or lemonade, or cream and water; with tea and coffee between them as uſual.

By this abſtinence from fermented liquors he kept quite free from the gout for fifteen or ſixteen years; and then began to take ſmall-beer mixed with water occaſionally, or wine and water, or perry and water, or cyder and water; by which indulgence after a few months he had again a paroxyſm of gout, which continued about three days in the ball of his toe; which occaſioned him to return to his habit of drinking water, and has now for above twenty years kept in perpetual health, except accidental colds from the changes of the ſeaſons. Before he abſtained from fermented or ſpirituous liquors, he was frequently ſubject to the piles, and to the gravel, neither of which he has ſince experienced.

In the following caſe the gout was eſtabliſhed by longer habit and greater violence, and therefore required more cautious treatment. The Rev. R. W. was ſeized with the gout about the age of thirty-two, which increaſed ſo rapidly that at the age of forty-one he was confined to his room ſeven months in that year; he had ſome degree of lameneſs during the intervals, with chalky ſwellings of his heels and elbows. As the diſeaſe had continued ſo long and ſo violently, and the powers of his digeſtion were ſomewhat weakened, he was adviſed not entirely to leave off all fermented liquors; and as ſmall-beer is of ſuch various ſtrength, he was adviſed to drink exactly two wine glaſſes, about four ounces, of wine mixed with three or four times its quantity of water, with or without lemon and ſugar, for his daily potation at dinner, and no other fermented liquor of any kind; and was adviſed to eat fleſh-meat with any kind of boiled vegetables, and fruit, with or without ſpice. He has now ſcrupuloully continued this regimen for above five years, and has had an annual moderate gouty paroxyſm of a few weeks, inſtead of the confinement of ſo many months, with great health and good ſpirits during the intervals.

The following is a more particular account of the hiſtory of this caſe; being part of a letter which Mr. Wilmot wrote on that ſubject at my entreaty.

" I entered into the army with an excellent conſtitution at the age of fifteen. The corps I ſerved in was diſtinguiſhed by its regularity, that is, the regular allowance of the meſs was only one pint of wine per man each day; unleſs we had company to dine with us; then, as was the general cuſtom of the time, the bottle circulated without limit. This mode of living, though by no means conſidered as exceſs for men, was certainly too great for a youth of my age. This ſtyle of living I continued, when with the regiment, till the latter end of the year 1769, when I had the misfortune to ſleep in a damp bed at Sheffield on a journey to York, but arrived there before I felt the ill effects of it. I was then ſeized with a violent inflammatory rheumatiſm with great inflammation of my eyes, and was attended by Dr. Dealtry; ſo violent was the diſorder, that I was bled for it eight times in leſs than a fortnight; and was three months, before I could conſider my health perfectly re-eſtabliſhed. Dr. Dealtry told me, that I ſhould be ſubject to ſimilar attacks for many years; and that he had no doubt, from the tendency he found in my habit to inflammation, that, when I was farther advanced in life, I ſhould change that complaint for the gout. He predicted truly; for the three ſucceeding winters I had the ſame complaint, but not ſo violently; the fourth winter I eſcaped, and imputed my eſcape to the continuance of cold bathing during the whole of that winter; after that I never eſcaped it, till I had a regular and ſevere fit of the gout: after the firſt attack of rheumatic fever I was more abſtemious in my manner of living; though when in company I never ſubjected myſelf to any great reſtraint. In the year 1774 I had quitted the army, and being in a more retired ſituation, was ſeldom led into any exceſs; in 1776 and 1777 I was in the habit of drinking a good deal of wine very frequently, though not conſtantly. After that period till the year 1781, I drank a larger quantity of wine regularly, but very ſeldom to any degree of intoxication. I lived much at that time in the ſociety of ſome gentlemen, who uſually drank nearly a bottle of wine daily after dinner. I muſt here however obſerve, that at no part of my life was I accuſtomed to drink wine in an evening, and very ſeldom drank any thing more than a ſingle half-pint glaſs of ſome ſort of ſpirits diluted with much water. Till the year 1781 I had always been accuſtomed to uſe very violent and continued exerciſe on horſeback; in the winter months I purſued all field diverſions, and in the ſummer months I rode frequent and long journeys; and with this exerciſe was liable to perſpire to great exceſs; beſides which I was ſubject to very profuſe night-ſweats, and had frequently boils break out all over me, eſpecially in the ſpring and autumn; for which I took no medicine, except a little flour of ſulphur with cream of tartar in honey.

"You will obſerve I bring every thing down to the date of 1781. In the month of October in that year, when I was juſt entered into the thirty-ſecond year of my age, I had the firſt attack of gout; that fit was very ſevere, and of many weeks continuance. I now determined upon a more abſtemious method of living, in reſpect to wine; and indeed the ſociety, in which I had before been accuſtomed to live, being conſiderably changed, I had leſs frequent temptations to exceſs. From this time I enjoyed the moſt perfect good ſtate of health till Auguſt 1784, when I had my ſecond attack of gout. I never perfectly recovered from this attack through the ſucceeding winter, and in March 1785 was adviſed to try the Bath waters, and drank them under the direction of one of the faculty of that place. I was there ſoon ſeized with a fever, and a ſlight attack of gout in one knee. I ſhould obſerve, that when I ſet out from home, I was in a weak and low ſtate, and unequal to much fatigue; as appeared by my having a fainting fit one day on the road, after having travelled only about fifty miles; in the courſe of the ſummer I had two or three more ſlight attacks of gout of leſs conſequence, till the month of October; when I was afflicted with it all over me in ſuch a manner, as to be without the poſſibility of the leaſt degree of removal for ſome days; and was about two months without being able to get into the air. This was the ſevereſt attack I had then experienced; though I have ſince had ſeveral equally ſevere. In the courſe of this ſummer I had a fall with my horſe; and ſoon after it, having diſcovered an enlargement on one elbow, I concluded I had hurt it at that time; but in the courſe of this laſt attack having a ſimilar enlargement on the other elbow, I found my miſtake, and that they were collections of gouty matter; theſe increaſed to the ſize of pullet's eggs, and continue in that ſtate, I had ſoon after ſimilar enlargements on my heels; the right heel being ſeverely bruiſed, I was under the neceſſity of having it lanced, and a large quantity of chalky matter was diſcharged from it; and have ſince that time frequently had chalky matter taken from it, and ſometimes ſmall bits of apparently perfect chalk. My right hand ſoon was afflicted in the ſame way, and I have ſcarcely a joint on thoſe fingers now in a natural ſtate. My left hand has eſcaped tolerably well. After this laſt attack (viz. October 1785), I had two or three ſlight attacks before the month of June 1787, when I had a very ſevere intermittent fever; from that time I continued very well till the latter end of the year, when I began to feel the gout about me very much, but was not confined by it. I was in this ſtate adviſed to try what is called the American Recipe (gum guaiacum and nitre diſſolved in ſpirits); it had apparently been of eſſential ſervice to a friend of mine, who from the inability to walk a mile for ſome years, was believed to be reſtored by the uſe of this medicine to a good ſtate of health, ſo as to walk ten miles a day. In addition to this medicine I drank, as my common beverage with my meals, ſpruce beer. I had ſo high an opinion of this medicine in the gout, and of ſpruce beer as an antiſcorbutic, that I contemplated with much ſatisfaction, and with very little doubt, the perfect reſtoration of my health and ſtrength; but I was miſerably deceived; for in September 1788 I was ſeized with the gout in a degree that none but arthritics, and indeed but few of thoſe, can eaſily conceive. From this time till Auguſt 1789 I ſcarcely ever paſſed a comfortable day; ſeven months of this time I had been confined, my health ſeemed much impaired, my ſtrength was diminiſhed, and my appetite almoſt gone. In this ſtate my friends preſſed me to conſult you. I was unwilling for ſome time to do it, as I had loſt all hope of relief; however, when I had determined to apply to you, I likewiſe determined to give up every prejudice of my own reſpecting my caſe, and to adhere moſt ſtrictly to your advice. On the 20th of Auguſt 1789 I conſulted you, on the 25th I entered upon the regimen, which you preſcribed, and which was as follows.

"Drink no malt liquor on any account. Let your "beverage at dinner conſiſt of two glaſſes of wine "diluted with three half-pints of water. On no "account drink any more wine or ſpirituous liquors "in the courſe of the day; but, if you want more "liquid, take cream and water, or milk and water, "or lemonade, with tea, coffee, chocolate. Uſe the "warm bath twice a week for half an hour before "going to bed, at the degree of heat which is moſt "grateful to your ſenſations. Eat meat conſtantly "at dinner, and with it any kind of tender vege"tables you pleaſe. Keep the body open by two "evacuations daily, if poſſible without medicine, if "not take the ſize of a nutmeg of lenitive electuary "occaſionally, or five grains of rhubarb every night. "Uſe no violent exerciſe, which may ſubject yourſelf "to ſudden changes from heat to cold; but as much "moderate exerciſe as may be, without being much "fatigued or ſtarved with cold. Take ſome ſupper "every night; a ſmall quantity of animal food is "preferred; but if your palate refuſes this, take "vegetable food, as fruit pie, or milk; ſomething "ſhould be eaten, as it might be injurious to you to "faſt too long." To the whole of this I adhered moſt ſcrupulouſly, and ſoon found my appetite improve, and with it my ſtrength and ſpirits. I had in December a ſevere attack, and two or three ſlight ones in the courſe of twelve months; but the improvement in the general ſtate of my health induced me to preſevere. On the 18th of Auguſt 1790 I had another ſevere attack, but it went off eaſier than before, and I ſoon recovered ſufficiently to go to Buxton, which you adviſed me to, and from which I reaped great benefit; nevertheleſs on the 29th of December I had a ſlight attack in compariſon of ſome that I had before experienced, and from that time I was free from gout, and enjoyed my health perfectly well till the fourth week in October 1791; from that till the third week in October 1792; from that till the third week in October 1793; and from that till June 1794. From what happened for the laſt three years I dreaded the month of October; but I eſcaped then, and have enjoyed my health moſt perfectly ever ſince till within the laſt week, that I have had a ſlight attack in one knee, which is nearly gone, without any ſymptom to lead me to ſuppoſe that it will go further.

"I adhered to your advice moſt ſcrupulouſly for the firſt year; and in regard to the not drinking malt liquor, and taking only the two glaſſes of wine with water, I have never deviated but two days; and then the firſt day I only drank one glaſs of ale and one glaſs of Champaigne; on the ſecond only one glaſs of Champaigne. With regard to the warm bath, I only uſe it now when I have gouty ſymptoms upon me, and in ſuch ſituations I find it of infinite ſervice; and in other reſpects I continue to live according to your direction.

"Many perſons have laughed at the idea of my perſeverance in a ſyſtem, which has not been able to *cure* the gout after five years trial; but ſuch perſons are either ignorant of what I before ſuffered, or totally unacquainted with the nature of the diſorder. Under the bleſſing of Providence, by an adherence to your advice, I am reaping all the benefit you flattered me I might expect from it, viz. my attacks leſs frequent, my ſufferings leſs acute, and an improvement in the general ſtate of my health.

"I have been particular in this account of myſelf at your requeſt, and am, Sir, &c.

Morley, near Derby,
February 10th, 1795.

Robert Wilmot."

There are ſituations nevertheleſs in which a paroxyſm of gout has been believed to be deſirable, as relieving the patient from other diſagreeable diſeaſes, or debilities, or ſenſations. Thus when the liver is torpid, a perpetual uneaſineſs and depreſſion of ſpirits occur; which a fit of gout is ſuppoſed to cure by a metaſtaſis of the diſeaſe. Others have acquired epileptic fits, probably from the diſagreeable ſenſation of a chronically inflamed liver; which they ſuppoſe the pain and inflammation of gout would relieve. When gouty patients become much debilitated by the progreſs of the diſeaſe, they are liable to dropſy of the cheſt, which they ſuppoſe a fit of the gout would relieve. But in all theſe caſes the attempt to procure a paroxyſm of gout by wine, or aromatics, or volatiles, or bliſters, or mineral waters, ſeldom ſucceeds; and the patients are obliged to apply to other methods of relief adapted to their particular caſes. In the two former ſituations ſmall repeated doſes of calomel, or mercurial unction on the region of the liver may ſucceed, by giving new activity to the veſſels of the liver, either to ſecrete or to abſorb their adapted fluids, and thus to remove the cauſe of the gout, rather than to promote a fit of it. In the laſt caſe the tincture of digitalis, and afterwards the claſs of ſorbentia, muſt be applied to.

M. M. In young ſtrong patients the gout ſhould be cured by veneſection and cathartics and diluents, with poultices externally. But it has a natural criſis by producing calcareous matter on the inflamed membrane, and therefore in old enfeebled people it is ſafeſt to wait for this criſis, attending to the natural evacuations and the degree of fever; and in young ones, where it is not attended with much fever, it is cuſtomary and popular not to bleed, but only to keep the body open with aloes, to uſe gentle ſudorifics, as neutral ſalts, and to give the bark at the decline of the fit; which is particularly uſeful where the patient is much debilitated. See Arthritis ventriculi, Claſs I. 2. 4. 6. and Sect. XXV. 17.

When there is not much fever, and the patient is debilitated with age, or the continuance of the diſeaſe, a moderate opiate, as twenty drops of tincture of opium, or one grain of ſolid opium, may be taken every night with advantage. Externally a paſte made with double the quantity of yeaſt is a good poultice; and booterkins made with oiled ſilk, as they confine the perſpirable matter, keep the part moiſt and ſupple, and thence relieve the pain like poultices.

The only ſafe way of moderating the diſeaſe is by an uniform and equal diminution, or a total abſtinence from fermented liquors, with the cautions directed in Sect. XII. 7. 8. The continued uſe of ſtrong bitters, as of Portland's powder, or bark, has been frequently injurious, as ſpoken of in the Materia Medica, Art. IV. 2. 11.

One of my acquaintance, who was much afflicted with the gout, abſtained for about half a year from beer and wine; and not having reſolution to perſiſt, returned to his former habits of potation in leſs quantity; and obſerved that he was then for one winter ſtronger and freer from the gout than uſual. This however did not long continue, as the diſeaſe afterwards returned with its uſual or increaſed violence. This I think is a circumſtance not unlikely to occur, as opium has a greater effect after its uſe has been a while intermitted; and the debility or torpor, which is the cauſe of gout, is thus for a few months prevented by the greater irritability of the ſyſtem, acquired during the leſſened uſe of fermented liquor.

For the ſame reaſon an ounce of ſpirituous tincture of guaiacum, or of bark, is ſaid to have for ſome time prevented returns of the gout; which has afterwards, like all other great ſtimuli when long continued, been ſucceeded by greater debility, and deſtroyed the patient. This ſeems to have been exemplified in the caſe of the ingenious Dr. Brown, ſee Preface to his

Elementa Medicinæ; he found temporary relief from the ſtimulus of wine, regardleſs of its future effects.

16. *Rheumatiſmus.* Acute rheumatiſm. There is reaſon to ſuſpect, that rheumatic inflammations, like the gouty ones, are not a primary diſeaſe; but that they are the conſequence of a tranſlation of morbid action from one part of the ſyſtem to another. This idea is countenanced by the frequent change of place of rheumatic-like gouty inflammations, and from their attacking two ſimilar parts at the ſame time, as both ancles and both wriſts, and theſe attacks being in ſucceſſion to each other. Whereas it is not probable that both feet or both hands ſhould at the ſame time be equally expoſed to any external cauſe of the diſeaſe, as to cold or moiſture; and leſs ſo that theſe ſhould occur in ſucceſſion. Laſtly, from the inflammatory diatheſis in this diſeaſe being more difficult to ſubdue, and more dangerous in event, than other common inflammations, eſpecially to pregnant women, and in weak conſtitutions.

From this idea of the rheumatiſm being not a primary diſeaſe, like the gout, but a transferred morbid action owing to the previous torpor of ſome other part of the ſyſtem, we perceive why it attacks weak people with greater pertinacity than ſtrong ones; reſiſting or recurring again and again after frequent evacuations, in a manner very different from primary inflammations; becauſe the cauſe is not removed, which is at a diſtance from the ſeat of the inflammation.

This alſo accounts for rheumatic inflammations ſo very rarely terminating in ſuppuration, becauſe like the gout the original cauſe is not in the inflamed part, and therefore does not continue to act after the inflammation commences. Inſtead of ſuppuration in this diſeaſe, as well as in the gout, a quantity of mucus or coagulable lymph is formed on the inflamed membrane; which in the gout changes into chalkſtones, and in the rheumatiſm is either reabſorbed, or lies on the membrane, producing pains on motion long after the termination of the inflammation, which pains are called chronic rheumatiſm. The membranes, which have thus been once or repeatedly inflamed, become leſs mobile, or leſs liable to be affected by ſympathy, as appears by the gout affecting new parts, when the joints of the foot have been frequently inflamed by it; hence as the cauſe of the inflammation does not exiſt in the inflamed part, and as this part becomes leſs liable to future attacks, it ſeldom ſuppurates.

Secondly, when rheumatiſm affects the muſcles of the cheſt, it produces ſymptoms ſimilar to pleuriſy, but are diſtinguiſhed from that by the patient having previouſly ſuffered rheumatic affections in other parts, and by the pertinacity or continuance of the inflammatory ſtate of the patient, this ſhould be termed pleurodyne rheumatica.

Thirdly, when rheumatic inflammation affects the bowels, it produces a diſeaſe very different from enteritis, or common inflammation of the bowels, and ſhould be termed enteralgia rheumatica. The pain is leſs than in enteritis, and the diſeaſe of longer continuance, with harder pulſe, and the blood equally ſizy. It is attended with frequent dejections, with much mucus, and previous griping pains, but without vomiting; and differs perhaps from dyſentery from its not being attended with bloody ſtools, and not being infectious.

Fourthly, there is another kind of rheumatiſm attended with debility, which ſuppurates, and ſhould be termed rheumatiſmus ſuppurans. It is generally believed to be the gout, till ſuppuration takes place on the ſwelled joint; and, as the patient ſinks, there are ſloughs formed over the whole mouth; and he ſeems to be deſtroyed by inflammation or gangrene of the mucous membranes. I have twice ſeen this diſeaſe in patients about ſixty. Some other diſeaſes are erroneouſly called rheumatic, as hemicrania, and odontalgia. See Sect. XXVI. 3.

M. M. In the three former kinds veneſection repeatedly. Cathartics. Antimonials. Diluents. Neutral ſalts. Oil. Warm bath. Afterwards the bark. Opium with or without ipecacuanha; but not till the patient is conſiderably weakened. Sweats forced early in the diſeaſe do injury. Opium given early in the diſeaſe prolongs it. In the laſt kind, gentle ſtimulants, as wine and water, mucilage, ſorbentia.

The following is a caſe of ſuppurative rheumatiſm. Mr. F——, about ſixty, was ſuppoſed to have the gout in his hand, which however ſuppurated, and it was then called the ſuppurative rheumatiſm. He had lived rather intemperately in reſpect to wine, and was now afflicted with a tendency to inflammation of the mucous membranes. As he lay on the bed half reſupine, propped up with pillows, and alſo ſlept in that poſture, his lower jaw dropped by its own weight, when the voluntary power of the muſcles was ſuſpended. The mucus of his mouth and throat became quite dry, and at length was ſucceeded with ſloughs; this was a moſt diſtreſſing circumſtance to him, and was in vain endeavoured to be relieved by ſupporting his jaw by ſlender ſteel ſprings fixed to his night-cap, and by ſprings of elaſtic gum. The ſloughs ſpread and ſeemed to accelerate his death. See Claſs I. 1. 3. 2.

17. *Eryſipelas.* The eryſipelas differs from the zona ignea, and other ſpecies of herpes, in its being attended with fever, which is ſometimes of the ſenſitive irritated or inflammatory kind, with ſtrong and full pulſe; and at other times with weak pulſe and great inirritability, as when it precedes or attends mortifications. See Claſs II. 1. 3. 2.

Like the zona ignea above deſcribed, it ſeems to be a ſecondary diſeaſe, having for its primary part the torpor or inflammation of ſome internal or diſtant membrane, as appears from its ſo frequently attending wounds; ſometimes ſpreading from iſſues over the whole limb, or back, by ſympathy with a tendon or membrane, which is ſtimulated by the peaſe in them.

In its more violent degree I ſuppoſe that it ſympathizes with ſome extenſive internal membranes, as of the liver, ſtomach, or brain. Another reaſon, which countenances this idea, is, that the inflammation gradually changes its ſituation, one part healing as another inflames; as happens in reſpect to more diſtant parts in gout and rheumatiſm; and which ſeems to ſhew, that the cauſe of the diſeaſe is not in the ſame place with the inflammation. And thirdly, becauſe the eryſipelas of the face and head is liable to affect the membranes of the brain; which were probably in theſe caſes the original or primary ſeat of the diſeaſe; and laſtly, becauſe the fits of eryſipelas, like thoſe of the gout, are liable to return at certain annual or monthly periods, as further treated of in Claſs II. 1. 3. 2.

Many caſes of eryſipelas from wounds or bruiſes are related in Deſault's Surgical Journal, Vol. II. in which poultices are ſaid to do great injury, as well as oily or fatty applications. Saturnine ſolutions were ſometimes uſed with advantage. A grain of emetic tartar given to clear the ſtomach and bowels, is ſaid to be of great ſervice.

18. *Teſtium tumor in gonorrhœa.* Mr. Hunter in his Treatiſe on the Venereal Diſeaſe obſerves, that the tumor of the teſtes in gonorrhœa ariſes from their ſympathy with the inflammation of the urethra; and that they are not ſimilar to the actions ariſing from the application of venereal matter, whether by ab-

ſorption or otherwiſe; as they ſeldom or never ſuppurate; and when ſuppuration happens, the matter produced is not venereal. Treatiſe on Venereal Diſeaſe, p. 53.

19. *Teſtium tumor in parotidite.* The ſympathy between ſome parts about the throat and the genitals has been treated of in Claſs IV. 1. 2. 7. The ſwelling of the teſtes, when that of the parotis ſubſides, ſeems to ariſe from the aſſociation of ſucceſſive action; as the tenſion of the penis in hydrophobia appears to ariſe from the previous ſynchronous aſſociations of the ſenſitive motions of theſe parts; but the manner of the production of both theſe aſſociations is yet very obſcure. In women a ſwelling of the breaſts often ſucceeds the decline of the mumps by another wonderful ſympathy. See Claſs IV. 1. 2. 7. and I. 1. 2. 15. In many perſons a delirium ſucceeds the ſwelling of the parotis, or the ſubſequent ones of the teſtes or breaſts; which is ſometimes fatal, and ſeems to ariſe from a ſympathy of ſucceſſive action, and not of ſynchronous action, of the membranes of the brain with thoſe of the parotid glands. Sometimes a ſtupor comes on inſtead of this delirium, which is relieved by fomenting the ſhaved head for an hour or two. See Claſs II. 1. 3. 4.

ORDO I.

Increaſed Aſſociate Motions.

GENUS III.

Catenated with Voluntary Motions.

SPECIES.

1. *Deglutitio invita.* When any one is told not to ſwallow his ſaliva, and that eſpecially if his throat be a little ſore, he finds a neceſſity of immediately ſwallowing it; and this the more certainly, the more he voluntarily endeavours not to do ſo.

In this caſe the voluntary power exerted by our attention to the pharinx renders it more ſenſible to irritation, and therefore occaſions it to be more frequently induced to ſwallow the ſaliva. Here the irritation induces a volition to ſwallow it, which is more powerful than the deſire not to ſwallow it. See XXIV. 1. 7. So in reverie, when the voluntary power was exerted on any of the ſenſes, as of ſight or taſte, the objects of thoſe ſenſes became perceived; but not otherwiſe. Sect. XIX. 6. This is a troubleſome ſymptom in ſome ſore throats.

M. M. Mucilage, as ſugar and gum arabic. Warm water held in the mouth frequently, as a fomentation to the inflamed throat.

2. *Nictitatio invita.* Involuntary winking with the eye-lids, and twitchings of the face, are originally induced by an endeavour to relieve ſome diſagreeable

able ſenſations about inflamed eyes, as the dazzling of light; and afterwards theſe motions become catenated with other motions or ſenſations, ſo as not to be governed by the will. Here the irritation firſt produces a volition to wink, which by habit becomes ſtronger than the anti-volition not to wink.

This ſubject is rendered difficult from the common acceptation of the word, volition, including previous deliberation, as well as the voluntary exertion, which ſucceeds it. In the volitions here ſpoken of there is no time for deliberation or choice of objects, but the voluntary act immediately ſucceeds the ſenſation which excites it.

M. M. Cover the affected parts with a ſticking plaſter or a bliſter. Paſs a fine needle and thread through a part of the ſkin over the muſcle, which moves, and attach the other end of the thread by a ſticking plaſter to a diſtant part. An iſſue behind the ear. To practice daily by a looking-glaſs to ſtop the motions with the hand. See the cure of a caſe of the leaping of a muſcle of the arm, Sect. XVII. 1. 8. See Convulſio debilis, Claſs III. 1. 1. 5.

3. *Riſus invitus.* Involuntary laughter. When the pleaſure ariſing from new combinations of words and ideas, as in puns; or of other circumſtances, which are ſo trivial, as to induce no voluntary exertion to compare or conſider their preſent importance or their future conſequence; the pleaſure is liable to riſe into pain; that is, the ideas or ſenſual motions become exerted too violently for want of ſome anti-

theſiſtic ideas; in the ſame manner as thoſe muſcles, which have weak antagoniſts, as thoſe of the calf of the leg, are liable to fall into cramp or painful contraction. In this ſituation a ſcream is begun to relieve this pain of ideas too violently exerted, which is ſtopped again ſoon, as explained in Sect. XXXIV. 1. 4. and Claſs III. 1. 1. 4. and IV. 2. 3. 3.

The pain, into which this pleaſure riſes, which would excite the ſcream of laughter, has been felt forcibly by every one; when they have been under ſuch circumſtances, as have induced them to reſtrain it by a counter-volition; till at length the increaſed aſſociate motions produce ſo much pain as to overcome the counter-volition, and the patient burſts out into indecent laughter, contrary to his will in the common acceptation of that word.

4. *Luſus digitorum invitus.* An awkward playing with the fingers in ſpeaking in public. Theſe habits are begun through baſhfulneſs, and ſeem rather at firſt deſigned to engage the attention in part, and thus prevent the diſagreeable ideas of mauvaiſe hont; as timorous boys whiſtle, when they are obliged to walk in the dark; and as it is ſometimes neceſſary to employ raw ſoldiers in perpetual manœuvres, as they advance to the firſt charge.

5. *Unguium morſiuncula invita.* Biting the nails is a depraved habit ariſing from ſimilar cauſes as thoſe of the laſt article.

M. M. Dip the fingers in ſolution of aloes.

6. *Vigilia invita.* Watchfulneſs, where the perſon wiſhes, and endeavours to fall aſleep, properly belongs to this place, as the wiſh or volition to ſleep prevents the deſired effect; becauſe ſleep conſiſts in an abolition of volition. See Claſs III. 1. 2. 3.

ORDO. I.

Increaſed Aſſociate Motions.

GENUS IV.

Catenated with External Influences.

SPECIES.

1. *Vita ovi.* Life of an egg. The eggs of fowls were ſhewn by Mr. J. Hunter to reſiſt the freezing proceſs in their living ſtate more powerfully, than when they were killed by having the yolk and white ſhook together. Philoſ. Tranſ. It may be aſked, does the heat during the incubation of eggs act as a ſtimulus exciting the living principle into activity? Or does it act ſimply as a cauſa ſine quâ non, as an influence, which penetrating the maſs, removes the particles of it to a greater diſtance from each other, ſo as to allow their movement over each other, in the ſame manner as heat is conceived to produce the fluidity of water; not by ſtimulus, but by its penetrating influence? Or may elementary heat in its uncombined ſtate be ſuppoſed to act only as an influence neceſſary

to life in its natural quantity; whence torpor and death follow the eduction of it from the body; but in its increaſed ſtate above what is natural, or uſual, that it acts as a ſtimulus; which we have a ſenſe to perceive; and which excites many parts of the ſyſtem into unnatural action? See Claſs IV. 1. 1. C.

2. *Vita hiemi-dormientium.* The torpor of inſects, and birds, and quadrupeds, during the cold ſeaſon, has been called ſleep; but I ſuppoſe it muſt differ very much from that ſtate of animal life, ſince not only all voluntary power is ſuſpended, but ſenſation and vaſcular motion has ceaſed, and can only be reſtored by the influence of heat. There have been related inſtances of ſnails, which have recovered life and motion on being put into water after having experienced many years of torpidity, or apparent death, in the cabinets of the curious. Here the water as well as the heat are required not only as a ſtimulus, but as a cauſa ſine quâ non of fluidity and motion, and conſequent life.

3. *Pullulatio arborum.* The annual reviveſcence of the buds of trees ſeems not only to be owing to the influence of the returning warmth of the ſpring, but alſo to be catenated with ſolar gravitation; becauſe ſeeds and roots and buds, which are analogous to the eggs of animals, put forth their ſhoots by a leſs quantity of heat in ſpring, than they had undergone in the latter part of autumn, which may however be aſ-

cribed to their previous torpid ſtate, and conſequent accumulation of ſenſorial power, or irritability; as explained in Botanic Garden, Part II. Cant. I. l. 322. note. Other circumſtances, which countenance the idea, that vegetation is affected by ſolar gravitation, as well as by heat, may be obſerved in the ripening of the ſeeds of plants both in thoſe countries where the ſummers are ſhort, and in thoſe where they are long. And by ſome flowers cloſing their bells at noon, or ſoon after; and hence ſeem to ſleep rather at ſolar diurnal periods, than from the influence of cold, or the deficiency of light.

4. *Orgaſmatis venerei periodus.* The venereal orgaſm of birds and quadrupeds commences or returns about the vernal or autumnal equinoxes, and thence ſeems in reſpect to their great periods to be governed by ſolar influence. But if this orgaſm be diſappointed of its object, it is ſaid to recur at about monthly periods, as obſerved in mares and bitches in this reſpect reſembling the female catamenia. See Sect. XXXVI. 2. 3. and Sect. XVI. 13.

5. *Brachii concuſſio electrica.* The movement of the arm, even of a paralytic patient, when an electric ſhock is paſſed through it, is owing to the ſtimulus of the exceſs of electricity. When a piece of zinc and ſilver, each about the ſize of a crown-piece, are placed one under the upper lip, and the other on the tongue, ſo as the outer edges may be brought into

contact,

contact, there is an appearance of light in the eyes, as often as the outer edges of theſe metals are brought into contact or ſeparated; which is another inſtance of the ſtimulus of the paſſage of electric ſhocks through the fibres of the organs of ſenſe, as well as through the muſcular fibres. See Sect. XII. 1. 1. and firſt addit. note to Vol. I. of this work. But in its natural ſtate electricity ſeems only to act as an influence on animal and vegetable bodies; of the ſalutary or injurious effects of which we have yet no preciſe knowledge.

Yet if regular journals were kept of the variations of atmoſpheric electricity, it is probable ſome diſcoveries of its influence on our ſyſtem might in time be diſcovered. For this purpoſe a machine on the principle of Mr. Bennet's electric doubler might be applied to the pendulum of a clock, ſo as to manifeſt, and even to record the daily or hourly variations of aerial electricity. Which has already been executed, and applied to the pendulum of a Dutch wooden clock, by Mr. Bennet, curate of Wirkſworth in Derbyſhire.

Beſides the variations of the degree or kind of atmoſpheric electricity, ſome animals, and ſome men, ſeem to poſſeſs a greater power of accumulating this fluid in themſelves than others. Of which a famous hiſtory of a Ruſſian prince was lately publiſhed; who, during the clear and ſevere froſts of that country, could not move himſelf in bed without luminous coruſcations. Such may have been the caſe of thoſe people, who have been related to have taken fire ſpontaneouſly,

taneouſly, and to have been reduced to aſhes. The electric concuſſion from the gymnotus electricus, and torpedo, are other inſtances of the power of the animal ſyſtem to accumulate electricity, as in theſe it is uſed as a weapon of defence, or for the purpoſe of taking their prey.

Some have believed that the accumulation or paſſage of the magnetic fluid might affect the animal ſyſtem, and have aſſerted that the application of a large magnet to an aching tooth has quickly effected a cure. If this experiment is again tried in odontalgia, or hemicrania, the painful membrane of the tooth or head ſhould be included between the ſouth and north poles of a horſe-ſhoe magnet, or between the contrary poles of two different magnets, that the magnetiſm may be accumulated on the torpid part.

6. *Oxygenatio ſanguinis.* The variation of the quantity of oxygen gas exiſting in the atmoſphere muſt affect all breathing animals; in its exceſs this too muſt be eſteemed a ſtimulus; but in its natural quantity would ſeem to act as an influence, or cauſe, without which animal life cannot exiſt even a minute. It is hoped that Dr. Beddoes's plan for a pneumatic infirmary, for the purpoſe of putting this and various other airs to the teſt of experiment, will meet with public encouragement, and render conſumption, aſthma, cancer, and many diſeaſes conquerable, which at preſent prey with unremitted devaſtation on all orders and ages of mankind.

7. *Humectatio corporis.* Water, and probably the vapour of water diſſolved or diffuſed in the atmoſphere, unites by mechanical attraction with the unorganized cuticle, and ſoftens and enlarges it; as may be ſeen in the looſe and wrinkled ſkin of the hands of waſher-women; the ſame probably occurs to the mucous membrane of the lungs in moiſt weather; and by thickening it increaſes the difficulty of reſpiration of ſome people; who are ſaid to be aſthmatical. So far water may be ſaid to act as an influx or influence, but when it is taken up by the mouths of the abſorbent ſyſtem, it muſt excite thoſe mouths into action, and then acts as a ſtimulus.

There appears from hence to be four methods by which animal bodies are penetrated by external things. 1. By their ſtimulus, which induces the abſorbent veſſels to imbibe them. 2. By mechanical attraction, as when water ſoftens the cuticle. 3. By chemical attraction, as when oxygen paſſes through the membranes of the air-veſſels of the lungs, and combines with the blood. And laſtly, by influx without mechanical attraction, chemical combination, or animal abſorption, as the univerſal fluids of heat, gravitation, electricity, magnetiſm, and perhaps of other ethereal fluids yet unknown.

ORDO II.

Decreaſed Aſſociate Motions.

GENUS I.

Catenated with Irritative Motions.

As irritative muſcular motions are attended with pain, when they are exerted too weakly, as well as when they are exerted too ſtrongly; ſo irritative ideas become attended with ſenſation, when they are exerted too weakly, as well as when they are exerted too ſtrongly. Which accounts for theſe ideas being attended with ſenſation in the various kinds of vertigo deſcribed below.

There is great difficulty in tracing the immediate cauſe of the deficiencies of action of ſome links of the aſſociations of irritative motions; firſt, becauſe the trains and tribes of motions, which compoſe theſe links, are ſo widely extended as to embrace almoſt the whole animal ſyſtem; and ſecondly, becauſe when the firſt link of an aſſociated train of actions is exerted with too great energy, the ſecond link by reverſe ſympathy may be affected with torpor. And then this ſecond link may tranſmit, as it were, this torpor to a third link, and at the ſame time regain its own energy of action; and it is poſſible this third link may in like manner tranſmit its torpor to a fourth, and thus regain its own natural quantity of motion.

I ſhall endeavour to explain this by an example taken from ſenſative aſſociated motions, as the origin of their diſturbed actions is more eaſily detected. This morning I ſaw an elderly perſon, who had gradually loſt all the teeth in his upper jaw, and all of the under except three of the molares; the laſt of theſe was now looſe, and occaſionally painful; the fangs of which were almoſt naked, the gums being much waſted both within and without the jaw. He is a man of attentive obſervation, and aſſured me, that he had again and again noticed, that, when a pain commenced in the membranes of the alveolar proceſs of the upper jaw oppoſite to the looſe tooth in the under one (which had frequently occured for ſeveral days paſt), the pain of the looſe tooth ceaſed. And that, when the pain afterwards extended to the ear and temple on that ſide, the pain in the membranes of the upper jaw ceaſed. In this caſe the membranes of the alveolar proceſs of the upper jaw became torpid, and conſequently painful, by their reverſe ſympathy with the too violent actions of the inflamed membranes of the looſe tooth; and then by a ſecondary ſympathy the membranes about the ear and temple became torpid, and painful; and thoſe of the alveolar proceſs of the upper jaw regained their natural quantity of action, and ceaſed to be painful. A great many more nice and attentive obſervations are wanted to elucidate theſe curious circumſtances of aſſociation, which will be found to be of the greateſt importance in the cure of many diſeaſes, and lead us to the knowledge of fever.

SPECIES.

1. *Cutis frigida pranſorum.* Chillneſs after dinner frequently attends weak people, or thoſe who have been exhauſted by exerciſe; it ariſes from the great expenditure of the ſenſorial power on the organs of digeſtion, which are ſtimulated into violent action by the aliment; and the veſſels of the ſkin, which are aſſociated with them, become in ſome meaſure torpid by reverſe ſympathy; and a conſequent chillneſs ſucceeds with leſs abſorption of atmoſpheric moiſture. See the ſubſequent article.

2. *Pallor urinæ pranſorum.* The paleneſs of urine after a full meal is an inſtance of reverſe aſſociation; where the ſecondary part of a train of aſſociate motions acts with leſs energy in conſequence of the greater exertions of the primary part. After dinner the abſorbent veſſels of the ſtomach and inteſtines are ſtimulated into greater action, and drink up the newly taken aliment; while thoſe, which are ſpread in great number on the neck of the bladder, abſorb leſs of the aqueous part of the urine than uſual, which is therefore diſcharged in a more dilute ſtate; and has been termed crude by ſome medical writers, but it only indicates, that ſo great a proportion of the ſenſorial power is expended on digeſtion and abſorption of the aliment, that other parts of the ſyſtem act for a time with leſs energy. See Claſs IV. 1. 1. 6.

3. *Pallor urinæ a frigore cutaneo.* There is a temporary diſcharge of pale water, and a diarrhœa, induced by expoſing the ſkin to the cold air; as is experienced by boys, who ſtrip themſelves before bathing. In this caſe the mouths of the cutaneous lymphatics become torpid by the ſubduction of their accuſtomed degree of heat, and thoſe of the bladder and inteſtines become torpid by direct ſympathy; whence leſs of the thinner part of the urinary ſecretion, and of the mucus of the inteſtines, is reabſorbed. See Sect. XXIX. 4. 6. This effect of ſuddenly cooling the ſkin by the aſperſion of cold water has been uſed with ſucceſs in coſtiveneſs, and has produced evacuations, when other means have failed. When young infants are afflicted with griping joined with coſtiveneſs, I have ſometimes directed them to be taken out of a warm bed, and carried about for a few minutes in a cool room, with almoſt inſtant relief.

4. *Pallor ex ægritudine.* When ſickneſs of ſtomach firſt occurs, a paleneſs of the ſkin attends it; which is owing to the aſſociation or catenation between the capillaries of the ſtomach and the cutaneous ones; which at firſt act by direct ſympathy. But in a ſhort time there commences an accumulation of the ſenſorial power of aſſociation in the cutaneous capillaries during their ſtate of inactivity, and then the ſkin begins to glow, and ſweats break out, from the increaſed action of the cutaneous glands or capillaries, which is now in

reverſe ſympathy with thoſe of the ſtomach. So in continued fevers, when the ſtomach is totally torpid, which is known by the total averſion to ſolid food, the cutaneous capillaries are by reverſe ſympathy in a perpetual ſtate of increaſed activity, as appears from the heat of the ſkin.

5. *Dyſpnœa a balneo frigido.* The difficulty of breathing on going up to the middle in cold water is owing to the irritative aſſociation or catenation of the action of the extreme veſſels of the lungs with thoſe of the ſkin. So that when the latter are rendered torpid or inactive by the application of ſudden cold, the former become inactive at the ſame time, and retard the circulation of the blood through the lungs, for this difficulty of breathing cannot be owing to the preſſure of the water impeding the circulation downwards, as it happens equally by a cold ſhower-bath, and is ſoon conquered by habitual immerſions. The capillaries of the ſkin are rendered torpid by the ſubduction of the ſtimulus of heat, and by the conſequent diminution of the ſenſorial power of irritation. The capillaries of the lungs are rendered torpid by the diminution of the ſenſorial power of aſſociation, which is now excited in leſs quantity by the leſſened actions of the capillaries of the *ſkin*, with which they are catenated. So that at this time both the cutaneous and pulmonary capillaries are principally actuated, as far as they have any action, by the ſtimulus of the blood. But in a ſhort time the ſenſorial powers of irritation, and of aſſociation, become accumulated, and very

energetic

energetic action of both theſe membranes ſucceed, which thus reſemble the cold and hot fit of an intermittent fever.

6. *Dyſpepſia a pedibus frigidis.* When the feet are long cold, as in riding in cold and wet weather, ſome people are very liable to indigeſtion and conſequent heart-burn. The irritative motions of the ſtomach become torpid, and do their office of digeſtion imperfectly, in conſequence of their aſſociation with the torpid motions of the veſſels of the extremities. Fear, as it produces paleneſs and torpidity of the ſkin, frequently occaſions temporary indigeſtion in conſequence of this aſſociation of the veſſels of the ſkin with thoſe of the ſtomach; as riding in very bad roads will give flatulency and indigeſtion to timorous people.

A ſhort expoſure to cold air increaſes digeſtion, which is then owing to the reverſe ſympathy between the capillary veſſels of the ſkin, and of the ſtomach. Hence when the body is expoſed to cold air, within certain limits of time and quantity of cold, a reverſe ſympathy of the ſtomach and the ſkin firſt occurs, and afterwards a direct ſympathy. In the former caſe the expenditure of ſenſorial power by the ſkin being leſſened, but not its production in the brain; the ſecond link of the aſſociation, viz. the ſtomach, acquires a greater ſhare of it. In the latter caſe, by the continuation of the deficient ſtimulus of heat, the torpor becomes extended to the brain itſelf, or to the trunks of the nerves; and univerſal inactivity follows.

7. *Tuſſis a pedibus frigidis* On ſtanding with the feet in thawing ſnow, many people are liable to inceſſant coughing. From the torpidity of the abſorbent veſſels of the lungs, in conſequence of their irritative aſſociations with thoſe of the ſkin, they ceaſe to abſorb the ſaline part of the ſecreted mucus; and a cough is thus induced by the irritation of this ſaline ſecretion; which is ſimilar to that from the noſtrils in froſty weather, but differs in reſpect to its immediate cauſe; the former being from aſſociation with a diſtant part, and the latter from defect of the ſtimulus of heat on the noſtrils themſelves. See Catarrhus frigidus, Claſs I. 2. 3. 3.

8. *Tuſſis hepatica.* The cough of inebriates, which attends the enlargement of the liver, or a chronical inflammation of its upper membrane, is ſuppoſed to be produced by the inconvenience the diaphragm ſuffers from the compreſſion or heat of the liver. It differs however eſſentially from that attending hepatitis, from its not being accompanied with fever. And is perhaps rather owing to irritative aſſociation, or reverſe ſympathy, between the lungs and the liver. As occurs in ſheep, which are liable to a perpetual dry cough, when the fleuk-worm is preying on the ſubſtance of their livers. See Claſs II. 1. 1. 5.

M. M. From half a grain to a grain of opium twice a day. A drachm of mercurial ointment rubbed on the region of the liver every night for eight or ten times.

9. *Tuſſis arthritica.* Gout-cough. I have ſeen a cough, which twice occurred at a few years diſtance in the ſame perſon, during his fits of the gout, with ſuch pertinacity and violence as to reſiſt veneſection, opiates, bark, bliſters, mucilages, and all the uſual methods employed in coughs. It was for a time ſuppoſed to be the whooping-cough, from the violence of the action of coughing; it continued two or three weeks, the patient never being able to ſleep more than a few minutes at once during the whole time, and being propped up in bed with pillows night and day.

As no fever attended this violent cough, and but little expectoration, and that of a thin and frothy kind, I ſuſpected the membrane of the lungs to be rather torpid than inflamed, and that the ſaline part of the mucus not being abſorbed ſtimulated them into perpetual exertion. And laſtly, that though the lungs are not ſenſible to cold and heat, and probably therefore leſs mobile; yet, as they are nevertheleſs liable to conſent with the torpor of cold feet, as deſcribed in Species 6 of this Genus, I ſuſpected this torpor of the lungs to ſucceed the gout in the feet, or to act a vicarious part for them.

10. *Vertigo rotatoria.* In the vertigo from circumgyration the irritative motions of viſion are increaſed; which is evinced from the pleaſure that children receive on being rocked in a cradle, or by ſwinging on a rope. For whenever ſenſation ariſes from the pro-

duction of irritative motion with leſs energy than natural, it is of the diſagreeable kind, as from cold or hunger; but when it ariſes from their production with greater energy than natural, if it be confined within certain limits, it is of the pleaſurable kind, as by warmth or wine. With theſe increaſed irritative motions of viſion, I ſuppoſe thoſe of the ſtomach are performed with greater energy by direct ſympathy; but when the rotatory motions, which produce this agreeable vertigo, are continued too long, or are too violent, ſickneſs of the ſtomach follows; which is owing to the decreaſed action of that organ from its reverſe ſympathy with the increaſed actions of the organ of viſion. For the expenditure of ſenſorial power by the organ of viſion is always very great, as appears by the ſize of the optic nerves; and is now ſo much increaſed as to deprive the next link of aſſociation of its due ſhare. As mentioned in Article 6 of this Genus.

In the ſame manner the undulations of water, or the motions of a ſhip, at firſt give pleaſure by increaſing the irritative motions belonging to the ſenſe of viſion; but produce ſickneſs at length by expending on one part of the aſſociated train of irritative actions too much of that ſenſorial power, which uſually ſerved the whole of it; whence ſome other parts of the train acquire too little of it, and perform their actions in conſequence too feebly, and thence become attended with diſagreeable ſenſation.

It muſt alſo be obſerved, that when the irritative motions are ſtimulated into unuſual action, as in inebriation,

ebriation, they become ſucceeded by ſenſation, either of the pleaſurable or painful kind; and thus a new link is introduced between the irritative motions thus excited, and thoſe which uſed to ſucceed them; whence their aſſociation is either diſſevered or much weakened, and thus the vomiting in ſea-ſickneſs occurs from the defect of the power of aſſociation, rather than from the general deficiency of ſenſorial power.

When a blind man turns round, or when one, who is not blind, revolves in the dark, a vertigo is produced belonging to the ſenſe of touch. A blind man balances himſelf by the ſenſe of touch, which being a leſs perfect means of determining ſmall quantities of deviation from the perpendicular, occaſions him to walk more carefully upright than thoſe, who balance themſelves by viſion. When he revolves, the irritative aſſociations of the muſcular motions, which were uſed to preſerve his perpendicularity, become diſordered by their new modes of ſucceſſive exertion; and he begins to fall. For his feet now touch the floor in manners or directions different from thoſe they have been accuſtomed to; and in conſequence he judges leſs perfectly of the ſituation of the parts of the floor in reſpect to that of his own body, and thus loſes his perpendicular attitude. This may be illuſtrated by the curious experiment of croſſing one finger over the next to it, and feeling of a nut or bullet with the ends of them. When, if the eyes be cloſed, the nut or bullet appears to be two, from the deception of the ſenſe of touch.

In this vertigo from gyration, both of the ſenſe of ſight, and of the ſenſe of touch, the primary link of the aſſociated irritative motions is increaſed in energy, and the ſecondary ones are increaſed at firſt by direct ſympathy; but after a time they become decreaſed by reverſe ſympathy with the primary link, owing to the exhauſtion of ſenſorial power in general, or to the power of aſſociation in particular; becauſe in the laſt caſe, either pleaſurable or painful ſenſation has been introduced between the links of a train of irritative motions, and has diſſevered, or much enfeebled them.

Dr. Smyth, in his Eſſay on Swinging in Pulmonary Conſumption, has obſerved, that ſwinging makes the pulſe ſlower. Dr. Ewart of Bath confirmed this obſervation both on himſelf and on Col. Cathcart, who was then hectic, and that even on ſhipboard, where ſome degree of vertigo might be ſuppoſed previouſly to exiſt. Dr. Currie of Liverpool not only confirmed this obſervation frequently on himſelf, when he was alſo phthiſical, but found that equitation had a ſimilar effect on him, uniformly retarding his pulſe. This curious circumſtance cannot ariſe from the general effect of exerciſe, or fatigue, as in thoſe caſes the pulſe becomes weaker and quicker; it muſt therefore be aſcribed to a degree of vertigo, which attends all thoſe modes of motion, which we are not perpetually accuſtomed to.

Dr. Currie has further obſerved, that "in caſes of great debility the voluntary muſcular exertion requiſite in a ſwing produces wearineſs, that is, increaſes debility; and that in ſuch inſtances he had frequently noticed, that the diminution of the frequency of the pulſe did not take place, but the contrary." Theſe circumſtances may thus be accounted for.

The links of aſſociation, which are effected in the vertigo occaſioned by unuſual motion, are the irritative motions of the ſenſe of viſion, thoſe of the ſtomach, and thoſe of the heart and arteries. When the irritative ideas of viſion are exerted with greater energy at the beginning of vertigo, a degree of ſenſation is excited, which is of the pleaſurable kind, as above mentioned; whence the aſſociated trains of irritative motions of the ſtomach, and heart, and arteries, act at firſt with greater energy, both by direct ſympathy, and by the additional ſenſorial power of ſenſation. Whence the pulſe of a conſumptive patient becomes ſtronger and conſequently ſlower.

But if this vertigo becomes much greater in degree or duration, the firſt link of this train of aſſociated irritative motions expends too much of the ſenſorial power, which was uſually employed on the whole train; and the motions of the ſtomach become in conſequence exerted with leſs energy. This appears, becauſe in this degree of vertigo ſickneſs ſupervenes, as in ſea-ſickneſs, which has been ſhewn to be owing to leſs energetic action of the ſtomach. And the motions of the heart and arteries then become weaker, and in conſequence more frequent, by their direct ſympathy with the leſſened actions of the ſtomach. See Supplement, I. 12. and Claſs II. 1. 6. 7. The general weakneſs from fatigue is owing to a ſimilar cauſe, that is, to the too great expenditure of ſenſorial power in the increaſed actions of one part of the ſyſtem, and the conſequent deficiency of it in other parts, or in the whole.

The abatement of the heat of the ſkin in hectic fever by ſwinging, is not only owing to the increaſed ventilation of cool air, but to the reverſe ſympathy of the motions of the cutaneous capillaries with thoſe of the heart and arteries; which occurs in all fevers with arterial debility, and a hot or dry ſkin. Hence during moderate ſwinging the action of the heart and arteries becomes ſtronger and ſlower, and the action of the capillaries, which was before too great, as appeared by the heat of the ſkin, now is leſſened by their reverſe ſympathy with that of the heart and arteries. See Supplement, I. 8.

11. *Vertigo viſualis.* Viſual vertigo. The vertigo rotatoria deſcribed above, was induced by the rotation or undulation of external objects, and was attended with increaſed action of the primary link of the aſſociated motions belonging to viſion, and with conſequent pleaſure. The vertigo viſualis is owing to leſs perfect viſion, and is not accompanied with pleaſurable ſenſation. This frequently occurs in ſtrokes of the palſy, and is then ſucceeded by vomiting; it ſometimes precedes epileptic fits, and often attends thoſe, whoſe ſight begins to be impaired by age.

In this vertigo the irritative ideas of the apparent motions of objects are leſs diſtinct, and on that account are not ſucceeded by their uſual irritative aſſociations of motion; but excite our attention. Whence the objects appear to librate or circulate according to the motions of our heads, which is called dizzineſs; and we loſe the means of balancing ourſelves, or preſerving our perpendicularity, by viſion. So that in this vertigo the motions of the aſſociated organs are decreaſed by direct ſympathy with their primary link of irritation; as in the preceding caſe of ſea-ſickneſs they are decreaſed by reverſe ſympathy.

When vertigo affects people about fifty years of age, their ſight has generally been ſuddenly impaired; and from their leſs accurate viſion they do not ſoon enough perceive the apparent motions of objects; like a perſon in a room, the walls of which are ſtained with the uniform figures of lozenges, explained in Sect. XX. 1. This is generally aſcribed to indigeſtion; but it ceaſes ſpontaneouſly, as the patient acquires the habit of balancing himſelf by leſs diſtinct objects.

A gentleman about 50 was ſeized with an uncommon degree of vertigo, ſo as to fall on the ground, and not to be able to turn his head, as he ſat up either in his chair or in his bed, and this continued eight or ten weeks. As he had many decayed teeth in his mouth, and the vertigo was preceded and ſometimes accompanied by pains on one ſide of his head, the diſeaſe of a tooth was ſuſpected to be the cauſe.

And as his timidity was too great to admit the extraction of thoſe which were decayed; after the trial of cupping repeatedly, fomentations on his head, repeated bliſters with, valerian, Peruvian bark, muſk, opium, and variety of other medicines; mercurials were uſed, both externally and internally, with deſign to inflame the membranes of the teeth, and by that means to prevent the torpor of the action of the membranes about the temple, and parietal bone; which are catenated with the membranes of the teeth by irritative aſſociation, but not by ſenſitive aſſociation. The event was, that as ſoon as the gums became ſore with a ſlight ptyaliſm, the pains about the head and vertigo gradually diminiſhed, and during the ſoreneſs of his gums entirely ceaſed; but I believe recurred afterwards, though in leſs degree.

The idea of inflaming the membranes of the teeth to produce increaſed ſenſation in them, and thus to prevent their irritative connection with thoſe of the cranium, was taken from the treatment of triſmus, or locked jaw, by endeavouring to inflame the injured tendon; which is ſaid to prevent or to remove the ſpaſm of the muſcles of the jaw. See Claſs III. 1. 1. 13. and 15.

M. M. Emetics. Bliſters. Iſſues about the head. Extraction of decayed teeth. Slight ſalivation. Sorbentia. Incitantia.

12. *Vertigo ebrioſa.* Vertigo from intoxication is owing to the aſſociation of the irritative ideas of viſion with the irritative motions of the ſtomach. Whence

when theſe latter become much increaſed by the immoderate ſtimulus of wine, the irritative motions of the retina are produced with leſs energy by reverſe ſympathy, and become at the ſame time ſucceeded by ſenſation in conſequence of their decreaſed action. See Sect. XXI. 3. and XXXV. 1. 2. So converſely when the irritative motions of viſion are increaſed by turning round, or by our unaccuſtomed agitation at ſea, thoſe of the ſtomach become inverted by reverſe ſympathy, and are attended in conſequence with diſagreeable ſenſation. Which decreaſed action of the ſtomach is in conſequence of the increaſed expenditure of the ſenſorial power on the irritative ideas of viſion, as explained in Vertigo rotatoria.

Whence though a certain quantity of vinous ſpirit ſtimulates the whole ſyſtem into increaſed action, and perhaps even increaſes the ſecretion of ſenſorial power in the brain; yet as ſoon as any degree of vertigo is produced, it is a proof, that by the too great expenditure of ſenſorial power by the ſtomach, and its neareſt aſſociated motions, the more diſtant ones, as thoſe of viſion, become imperfectly exerted. From hence may be deduced the neceſſity of exhibiting wine in fevers with weak pulſe in only appropriated quantity; becauſe if the leaſt intoxication be induced, ſome part of the ſyſtem muſt act more feebly from the unneceſſary expenditure of ſenſorial power.

13. *Vertigo febriculoſa.* Vertigo in fevers either proceeds from the general deficiency of ſenſorial power belonging to the irritative aſſociations, or to a greater

expenditure of it on ſome links of the trains and tribes of aſſociated irritative motions. There is however a ſlighter vertigo attending all people, who have been long confined in bed, on their firſt riſing; owing to their having been ſo long unuſed to the apparent motions of objects in their erect poſture, or as they paſs by them, that they have loſt in part the habit of balancing themſelves by them.

14. *Vertigo cerebroſa.* Vertigo from injuries of the brain, either from external violence, or which attend paralytic attacks, are owing to the general deficiency of ſenſorial power. In theſe diſtreſsful ſituations the vital motions, or thoſe immediately neceſſary to life, claim their ſhare of ſenſorial power in the firſt place, otherwiſe the patient muſt die; and thoſe motions, which are leſs neceſſary, feel a deficiency of it, as theſe of the organs of ſenſe and muſcles; which conſtitute vertigo; and laſtly the voluntary motions, which are ſtill leſs immediately neceſſary to life, are frequently partially deſtroyed, as in palſy; or totally, as in apoplexy.

15. *Murmur aurium vertiginoſum.* The vertiginous murmur in the ears, or noiſe in the head, is compared to the undulations of the ſound of bells, or to the humming of bees. It frequently attends people about 60 years of age; and like the viſual vertigo deſcribed above is owing to our hearing leſs perfectly from the gradual inirritability of the organ on the approach of

age; and the diſagreeable ſenſation of noiſe attending it is owing to the leſs energetic action of theſe irritative motions; which not being ſufficiently diſtinct to excite their uſual aſſociations become ſucceeded by our attention, like the indiſtinct view of the apparent motions of objects mentioned in vertigo viſualis. This may be better underſtood from conſidering the uſe, which blind men make of theſe irritative ſounds, which they have taught themſelves to attend to, but which eſcape the notice of others. The late blind Juſtice Fielding walked for the firſt time into my room, when he once viſited me, and after ſpeaking a few words ſaid, "this room is about 22 feet long, 18 wide, and 12 high;" all which he gueſſed by the ear with great accuracy. Now if theſe irritative ſounds from the partial loſs of hearing do not correſpond with the ſize or uſual echoes of the places, where we are; their catenation with other irritative ideas, as thoſe of viſion, becomes diſſevered or diſturbed; and we attend to them in conſequence, which I think unravels this intricate circumſtance of noiſes being always heard in the head, when the ſenſe of hearing begins to be impaired, from whatever cauſe it occurs.

This ringing in the ears alſo attends the vertigo from intoxication; for the irritative ideas of ſound are then more weakly excited in conſequence of the deficiency of the ſenſorial power of aſſociation. As is known by this alſo being attended with diſagreeable ſenſation, and by its accompanying other diſeaſes of debility, as ſtrokes on the head, fainting fits, and paralytic ſeizures. For in this vertigo from intoxication ſo much ſenſorial power in general is expended on the increaſed actions of the ſtomach, and its neareſt connections, as the capillaries of the ſkin; that there is a deficiency for the purpoſes of the other irritative aſſociations of motions uſually connected with it. This auditory vertigo attends both the rotatory and the viſual vertigo above mentioned; in the former it is introduced by reverſe ſympathy, that is, by the diminution of ſenſorial power; too great a quantity of it being expended on the increaſed irritative motions of viſion; in the latter it is produced either by the ſame cauſes which produce the viſual vertigo, or by direct ſympathy with it. See Sect. XX. 7.

M. M. Stimulate the internal ear by ether, or with eſſential oil diluted with expreſſed oil, or with a ſolution of opium in wine, or in water. Or with ſalt and water.

16. *Tactus, guſtus, olfactus vertiginoſi.* Vertiginous touch, taſte, and ſmell. In the vertigo of intoxication, when the patient lies down in bed, it ſometimes happens even in the dark, that the bed ſeems to librate under him, and he is afraid of falling out of it. The ſame occurs to people, who are ſea-ſick, even when they lie down in the dark. In theſe the irritative motions of the nerves of touch, or irritative tangible ideas, are performed with leſs energy, in one caſe by reverſe ſympathy with the ſtomach, in

the other by reverſe ſympathy with the nerves of viſion, and in conſequence become attended with ſenſation, and produce the fear of falling by other aſſociations.

A vertigo of the ſenſe of touch may be produced, if any one turns round for a time with his eyes ſhut, and ſuddenly ſtops without opening them; for he will for a time ſeem to be ſtill going forwards; which is difficult to explain. See the notes at the end of the Firſt and Second Part belonging to Sect. XX. 6.

In the beginning of ſome fevers, along with inceſſant vomiting, the patients complain of diſagreeable taſtes in their mouth, and diſagreeable odours; which are to be aſcribed to the general debility of the great trains and tribes of aſſociated irritative motions, and to be explained from their direct ſympathy with the decreaſed action of a ſick ſtomach; or from the leſs ſecretion of ſenſorial power in the brain. Theſe organs of ſenſe are conſtantly ſtimulated into action by the ſaliva or by the air; hence, like the ſenſe of hunger, when they are torpid from want of ſtimulus, or from want of ſenſorial power, pain or diſagreeable ſenſation enſues, as of hunger, or faintneſs, or ſickneſs in one caſe; and the ideas of bad taſtes or odours in the other. This accords with the laws of cauſation, Sect. IV. 5.

17. *Pulſus mollis in vomitione.* The ſoftneſs of the pulſe in the act of vomiting is cauſed by direct aſſociation between the heart and the ſtomach; as explained

in Sect. XXV. 17. A great ſlowneſs of the pulſation of the heart ſometimes attends ſickneſs, and even with intermiſſions of it, as in the exhibition of too great a doſe of digitalis.

18. *Pulſus intermittens a ventriculo.* When the pulſe firſt begins to intermit, it is common for the patient to bring up a little air from his ſtomach; which if he accompliſhes before the intermiſſion occurs, always prevents it; whence that this debility of the heart is owing to the direct aſſociation of its motions with thoſe of the ſtomach is well evinced. See Sect. XXV. 17.

I this morning ſaw Mr. ——, who has long had at times an unequal pulſe, with indigeſtion and flatulency, and occaſional aſthma; he was ſeized two days ago with diarrhœa, and this morning with ſickneſs, and his pulſe was every way unequal. After an emetic his pulſe ſtill continued very intermittent and unequal. He then took ſome breakfaſt of toaſt and butter, and tea, and to my great ſurpriſe his pulſe became immediately perfectly regular, about 100 in a minute, and not weak, by this ſtimulus on his ſtomach.

A perſon, who for many years had had a frequent intermiſſion of his pulſe, and occaſional palpitation of his heart, was relieved from them both for a time by taking about four drops of a ſaturated ſolution of arſenic three or four times a day for three or four days. As this intermiſſion of the pulſe is occaſioned by the direct aſſociation of the motions of the heart with thoſe of the ſtomach, the indication of cure muſt be to ſtrengthen the action of the ſtomach by the bark. Spice. Moderate quantities of wine. A bliſter. Half a grain of opium twice a day. Solution of arſenic?

19. *Febris inirritativa.* Inirritative fever deſcribed in Claſs I. 2. 1. 1. belongs to this place, as it conſiſts of diſordered trains and tribes of aſſociated irritative motions, with leſſened actions of the aſſociated organs. In this fever the pulſations of the heart and arteries are weakened or leſſened, not only in the cold paroxyſm, as in the irritative fever, but alſo in the hot paroxyſm. The capillary arteries or glands have their actions nevertheleſs increaſed after the firſt cold fit, as appears by the greater production of heat, and the glow of arterial blood, in the cutaneous veſſels; and laſtly, the action of the ſtomach is much impaired or deſtroyed, as appears by the total want of appetite to ſolid food. Whence it would ſeem, that the torpid motions of the ſtomach, whatever may occaſion them, are a very frequent cauſe of continued fever with weak pulſe; and that theſe torpid motions of the ſtomach do not ſufficiently excite the ſenſorial power of aſſociation, which contributes in health to actuate the heart and arteries along with the irritation produced by the ſtimulus of the blood; and hence the actions of theſe organs are weaker. And laſtly, that the accumulation of the ſenſorial power of aſſociation, which ought to be expended on the motions of the

heart and arteries, becomes now exerted on the cutaneous and pulmonary capillaries. See Supplement I. 8. and Sect. XXXV. 1. 1. and XXXIII. 2. 10.

I have dwelt longer on the vertiginous diſeaſes in this genus, both becauſe of their great intricacy, and becauſe they ſeem to open a road to the knowledge of fever, which conſiſts of aſſociated trains and tribes of irritative or ſenſitive motions, which are ſometimes mixed with the vertiginous ones, and ſometimes ſeparate from them.

ORDO II.

Decreaſed Aſſociate Motions.

GENUS II.

Catenated with Senſitive Motions.

In this genus the ſenſorial power of aſſociation is exerted with leſs energy, and thence the actions produced by it are leſs than natural; and pain is produced in conſequence, according to the fifth law of animal cauſation, Sect. IV. This pain is generally attended with coldneſs of the affected part, and is ſeldom ſucceeded by inflammation of it. This decreaſed action of the ſecondary link of the aſſociated motions, belonging to this genus, is owing to the previous exhauſtion of ſenſorial power either in the increaſed actions of the primary link of the aſſociated motions, or by the pain which attends them; both which are frequently the conſequence of the ſtimulus of ſomething external to the affected fibres.

As pain is produced either by exceſs or defect of the natural exertions of the fibres, it is not, conſidered ſeparately, a criterion of the preſence of either. In the aſſociations belonging to this genus the ſenſation of pain or pleaſure produces or attends the primary link of the aſſociated motions, and very often gives name to the diſeaſe.

When great pain exiſts without cauſing any fibrous motions, I conjecture that it contributes to exhauſt or expend the general quantity of ſenſorial power; becauſe people are fatigued by enduring pain, till at length they ſleep. Which is contrary to what I had perhaps erroneouſly ſuppoſed in Sect. XXXV. 2. 3. If it cauſes fibrous motions, it then takes the name of ſenſation, according to the definition of ſenſation in Sect. II. 2. 9.; and increaſed fibrous action or inflammation is the conſequence. This circumſtance of the general exhauſtion of ſenſorial power by the exiſtence of pain will aſſiſt in explaining many of the diſeaſes of this genus.

Many of the canals of the body, as the urethra, the bile-duct, the throat, have the motions of their two extremities aſſociated by having been accuſtomed to feel pleaſurable or painful ſenſations at the ſame time or in ſucceſſion. This is termed ſenſitive aſſociation, though thoſe painful or pleaſurable ſenſations do not cauſe the motions, but only attend them; and are thus perhaps, ſtrictly ſpeaking, only catenated with them.

SPECIES.

1. *Torpor genæ a dolore dentis.* In tooth-ach there is generally a coldneſs of the cheek, which is ſenſible to the hand, and is attended in ſome degree with the pain of cold. The cheek and tooth have frequently been engaged in pleaſurable action at the ſame time during the maſticating of our food; whence they have acquired ſenſitive aſſociations. The torpor of the cheek may have for its cauſe the too great expenditure of ſenſorial power by the painful ſenſation of the membranes of the diſeaſed tooth; whence the membranes of the cheek aſſociated with thoſe of the alveolar proceſs are deprived of their natural ſhare of it, and become torpid; thus they produce leſs ſecretions, and leſs heat, and the pain of cold is the conſequence. This torpor of the veſſels of the cheek cannot be produced by the activity of the ſenſorial power of ſenſation; for then they would act more violently than natural, or become inflamed. And though the pain by exhauſting ſo much ſenſorial power may be a remote cauſe, it is the defect of the power of aſſociation, which is the immediate cauſe of the torpor of the cheek.

After ſome hours this pain occaſioned by the torpor of the veſſels of the cheek either gradually ceaſes along with the pain of the diſeaſed tooth; or, by the accumulation of ſenſorial power during their ſtate of torpor, the capillaries of the cheek act with greater violence, and produce more ſecretions, and heat, and conſequent tumour, and inflammation. In this ſtate the pain of the diſeaſed tooth ceaſes; as the ſenſorial power of ſenſation is now expended on the inflamed veſſels of the cheek. It is probable that moſt other internal membranous inflammations begin in a ſimilar manner; whence there may ſeem to be a double kind of ſenſitive aſſociation; firſt, with decreaſed action of the aſſociated organ, and then with increaſed action of it; but the latter is in this caſe ſimply the conſequence of the former; that is, the tumor or inflammation of the cheek is in conſequence of its previous quieſcence or torpor.

2. *Stranguria a dolore veſicæ.* The ſtrangury, which has its origin from pain at the neck of the bladder, conſiſts of a pain in the external extremity of the urethra or of the glans penis of men, and probably in the external termination of the urethra or of the clitoris of women; and is owing to the ſympathy of theſe with ſome diſtant parts, generally with the other end of the urethra; an endeavour and difficulty of making water attend this pain.

Its remote cauſe is from the internal or external uſe of cantharides, which ſtimulate the neck of the bladder; or from a ſtone, which whenever it is puſhed into the neck of the bladder, gives this pain of ſtrangury, but not at other times; and hence it is felt moſt ſeverely in this caſe after having made water.

The ſenſations or ſenſitive motions of the glans penis, and of the ſphincter of the bladder, have been accuſtomed to exiſt together during the diſcharge of the urine; and hence the two ends of the urethra ſympathize by aſſociation. When there is a ſtone at the neck of the bladder, which is not ſo large or rough as to inflame the part, the ſphincter of the bladder becomes ſtimulated into pain; but as the glans penis is for the purpoſes of copulation more ſenſitive than the ſphincter of the bladder, as ſoon as it becomes affected with pain by the aſſociation above mentioned, the ſenſation at the neck of the bladder ceaſes; and then the pain of the glans penis would ſeem to be aſſociated with the irritative motions only of the ſphincter of the bladder, and not with the ſenſitive ones of it. But a circumſtance ſimilar to this occurs in epileptic fits, which at firſt are induced by diſagreeable ſenſation, and afterwards ſeem to occur without previous pain, from the ſuddenneſs in which they follow and relieve the pain, which occaſioned them. From this analogy I imagine the pain of the glans penis is aſſociated with the pain of the ſphincter of the bladder; but that *as ſoon as the greater pain in a more ſenſible part is produced; the leſſer one, which occaſioned it, ceaſes;* and that this is one of the laws of ſenſitive aſſociation. See Sect. XXXV. 2. 1.

A young man had by an accident ſwallowed a large ſpoonful or more of tincture of cantharides; as ſoon as he began to feel the pain of ſtrangury, he was adviſed to drink large quantities of warmiſh water; to which, as ſoon as it could be got, ſome gum arabic was added. In an hour or two he drank by intervals of a few minutes about two gallons of water, and diſcharged his urine every four or five minutes. A little blood was voided towards the end, but he ſuffered no ill conſequences.

M. M. Warm water internally. Clyſters of warm water. Fomentation. Opium. Solution of fixed alkali ſuperſaturated with carbonic acid. A bougie may be uſed to puſh back a ſtone into the bladder. See Claſs I. 1. 3. 10.

3. *Stranguria convulſiva.* The convulſive ſtrangury, like that before deſcribed, is probably occaſioned by the torpor or defective action of the painful part in conſequence of the too great expenditure of ſenſorial power on the primary link of the aſſociated motions, as no heat or inflammation attends this violent pain. This kind of ſtrangury recurs by ſtated periods, and ſometimes ariſes to ſo great a degree, that convulſion or temporary madneſs terminates each period of it. It affects women oftener than men, is attended with cold extremities without fever, and is diſtinguiſhed from the ſtone of the bladder by the regularity of its periods, and by the pain being not increaſed after making water.

On introducing the catheter ſometimes part of the urine will come away and not the whole, which is difficult to explain; but may ariſe from the weakneſs of the muſcular fibres of the bladder; which are not liable ſuddenly to contract themſelves ſo far as to exclude the whole of the urine. In ſome old people, who have experienced a long retention of urine, the bladder never regains the power of completely emptying itſelf; and many who are beginning to be weak from age can make water a ſecond time, a few minutes after they ſuppoſed they had emptied the bladder.

I have believed this pain to originate from ſympathy with ſome diſtant part, as from aſcarides in the rectum, or from piles in women; or from caruncles in the urethra about the caput gallinaginis in men; and that the pain has been in the glans or clitoris by reverſe ſympathy of theſe more ſenſible parts with thoſe above mentioned.

M. M. Veneſection. Opium in large quantities. Warm bath. Balſams. Bark. Tincture of cantharides. Bougie, and the treatment for hæmorrhoids. Leeches applied to the ſphincter ani. Aerated alkaline water. Soap and ſal ſoda. Opium in clyſters given an hour before the expected return. Smoke of tobacco in clyſters. Arſenic?

4. *Dolor termini inteſtinalis ductûs choledochi.* Pain at the inteſtinal end of the gall-duct. When a gall-ſtone is protruded from the gall-bladder a little way into the end of the gall-duct, the pain is felt at the other end of the gall-duct, which terminates in the duodenum. For the actions of the two terminations of this canal are aſſociated together from the ſame ſtreams of bile paſſing through them in ſucceſſion, exactly as the two terminations of the urethra have their actions aſſociated, as deſcribed in Species 2 and 3 of this genus. But as the inteſtinal termination of the bile-duct is made more ſenſible for the purpoſe of bringing down more bile, when it is ſtimulated by

new ſupplies of food from the ſtomach, it falls into violent pain from aſſociation; and then the pain on the region of the gall-bladder ceaſes, exactly as above explained in the account of the pain of the glans penis from a ſtone in the ſphincter of the bladder.

The common bile-duct opens into the inteſtine exactly at what is called the pit of the ſtomach; and hence it has ſometimes happened, that this pain from aſſociation with the ſenſation of a gall-ſtone at the other end of the bile-duct has been miſtaken for a pain of the ſtomach.

For the method of cure ſee Claſs I. 1. 3. 8. to which ſhould be added the uſe of ſtrong electric ſhocks paſſed through the bile-duct from the pit of the ſtomach to the back, and from one ſide to the other. A caſe of the good effect of electricity in the jaundice is related in Sect. XXX. 2. And another caſe, where it promoted the paſſage of a painful gall-ſtone, is deſcribed by Dr. Hall, experienced on himſelf. Tranſ. of the College at Philadelphia, Vol. 1. p. 192.

Half a pint of warm water two or three times a day is much recommended to dilute the inſpiſſated bile.

5. *Dolor pharyngis ab acido gaſtrico.* The two ends of the throat ſympathize by ſenſitive aſſociation in the ſame manner as the other canals above mentioned, namely, the urethra and the bile-duct; hence when too great acidity of undigeſted aliment, or the car-

bonic acid air, which eſcapes in fermentation, ſtimulates the cardia ventriculi, or lower end of the gula, into pain; the pharinx, or upper end of it, is affected with greater pain, or a diſagreeable ſenſation of heat.

6. *Pruritus narium a vermibus.* The itching of the noſe from worms in the inteſtines is another curious inſtance of the ſenſitive aſſociations of the motions of membranes; eſpecially of thoſe which conſtitute the canals of the body. Previous to the deglutition of agreeable food, as milk in our earlieſt infancy, an agreeable odour affects the membrane, which lines the noſtrils; and hence an aſſociation ſeems to take place between the agreeable ſenſations produced by food in the ſtomach and bowels, and the agreeable ſenſations of the noſtrils. The exiſtence of aſcarides in the rectum I believe produces this itching of the noſtrils more than the worms in other parts of the inteſtines; as we have already ſeen, that the terminations of canals ſympathize more than their other parts, as in the urethra and gall-ducts. See Claſs I. 1. 5. 9. IV. 1. 2. 9.

7. *Cephalæa.* Head-ach. In cold fits of the ague, the head-ach ariſes from conſent with ſome torpid viſcus, like the pain of the loins. After drunkenneſs the head-ach is very common, owing to direct ſympathy of the membranes of the head with thoſe of the ſtomach; which is become torpid after the too violent

ſtimulus of the preceding intoxication; and is hence removable by ſpirit of wine, or opium, exhibited in ſmaller quantities. In ſome conſtitutions theſe head-achs are induced, when the feet are expoſed to much external cold; in this caſe the feet ſhould be covered with oiled ſilk, which prevents the evaporation of the perſpirable matter, and thence diminiſhes one cauſe of external cold.

M. M. Valerian in powder two drams three or four times a day is recommended. The bark. Chalybeates. A grain of opium twice a day for a long time. From five to ten drops of the ſaturated ſolution of arſenic two or three times a day. See Claſs I. 2. 4. 11. A lady once aſſured me, that when her head-ach was coming on, ſhe drank three pints (pounds) of hot water, as haſtily as ſhe could; which prevented the progreſs of the diſeaſe. A ſolution of arſenic is recommended by Dr. Fowler of York. Very ſtrong errhines are ſaid ſometimes to cure head-achs taken at the times the pain recurs, till a few drops of blood iſſue from the noſtrils. As one grain of turpeth mineral (vitriolic calx of mercury) mixed with ten grains of fine ſugar. Euphorbium or Cayan pepper mixed with ſugar, and uſed with caution as an errhine. See the M. M. of the next ſpecies.

8. *Hemicrania.* Pain on one ſide of the head. This diſeaſe is attended with cold ſkin, and hence whatever may be the remote cauſe, the immediate one ſeems to be want of ſtimulus, either of heat or diſtenſion, or of ſome other unknown ſtimulus in the

painful part; or in thoſe, with which it is aſſociated. The membranes in their natural ſtate are only irritable by diſtention; in their diſeaſed ſtate, they are ſenſible like muſcular fibres. Hence a diſeaſed tooth may render the neighbouring membranes ſenſible, and is frequently the cauſe of this diſeaſe.

Sometimes the ſtomach is torpid along with the pained membrane of the head; and then ſickneſs and inappetency attends either as a cauſe or conſequence. The natural cure of hemicrania is the accumulation of ſenſorial power during the reſt or ſickneſs of the patient. Mrs. —— is frequently liable to hemicrania with ſickneſs, which is probably owing to a diſeaſed tooth; the paroxyſm occurs irregularly, but always after ſome previous fatigue, or other cauſe of debility. She lies in bed, ſick, and without taking any ſolid food, and very little of fluids, and thoſe of the aqueous kind, and, after about 48 or 50 hours, riſes free from complaint. Similar to this is the recovery from cold paroxyſms of fever, from the torpor occaſioned by fear, and from ſyncope; which are all owing to the accumulation of ſenſorial power during the inactivity of the ſyſtem. Hence it appears, that, though when the ſenſorial power of volition is much exhauſted by fatigue, it can be reſtored by eight or ten hours of ſleep; yet, when the ſenſorial power of irritation is exhauſted by fatigue, that it requires two whole ſolar or lunar days of reſt, before it can be reſtored.

The late Dr. Monro aſſerted in his lectures, that he cured the hemicrania, or megrim, by a ſtrong vomit, and a briſk purge immediately after it. This method ſucceeds beſt if opium and the bark are given in due quantity after the operation of the cathartic; and with ſtill more certainty, if bleeding in ſmall quantity is premiſed, where the pulſe will admit of it. See Sect. XXXV. 2. 1.

The pain generally affects one eye, and ſpreads a little way on that ſide of the noſe, and may ſometimes be relieved by preſſing or cutting the nerve, where it paſſes into the bone of the orbit above the eye. When it affects a ſmall defined part on the parietal bone on one ſide, it is generally termed Clavus hyſtericus, and is always I believe owing to a diſeaſed dens molaris. The tendons of the muſcles, which ſerve the office of maſtication, have been extended into pain at the ſame time, that the membranous coverings of the roots of the teeth have been compreſſed into pain, during the biting or maſtication of hard bodies. Hence when the membranes, which cover the roots of the teeth, become affected with pain by a beginning decay, or perhaps by the torpor or coldneſs of the dying part of the tooth, the tendons and membranous faſcia of the muſcles about the ſame ſide of the head become affected with violent pain by their ſenſitive aſſociations: and as ſoon as this aſſociated pain takes place, the pain of the tooth entirely ceaſes, as explained in the ſecond ſpecies of this genus.

A remarkable circumſtance attends this kind of hemicrania, viz. that it recurs by periods like thoſe of intermittent fevers, as explained in the Section on Catenation of Motions; theſe periods ſometimes correſpond with alternate lunar or ſolar days like tertian agues, and that even when a decaying tooth is evidently the cauſe; which has been evinced by the cure of the diſeaſe by extracting the tooth. At other times they obſerve the monthly lunations, and ſeem to be induced by the debility, which attends menſtruation.

The dens ſapientiæ, or laſt tooth of the upper jaw, frequently decays firſt, and gives hemicrania over the eye on the ſame ſide. The firſt or ſecond grinder in the under-jaw is liable to give violent pain about the middle of the parietal bone, or ſide of the head, on the ſame ſide, which is generally called the Clavus hyſtericus, of which an inſtructive caſe is related in Sect. XXXV. 2. 1.

M. M. Detect and extract the diſeaſed tooth. Cut the affected nerve, or ſtimulate the diſeaſed membrane by acupuncture. Veneſection to ſix ounces by the lancet or by leeches. A ſtrong emetic and a ſubſequent cathartic; and then an opiate and the bark. Paſs ſmall electric ſhocks through the pained membrane, and through the teeth on the ſame ſide. Apply vitriolic ether externally, and a grain of opium with camphor internally, to the cheek on the affected ſide, where a diſeaſed tooth may be ſuſpected. Foment the head with warm vinegar. Drink two large ſpoonfuls of vinegar. Stimulate the gums of the ſuſpected teeth by oil of cloves, by opium. See Claſs I. 1. 4. 4. Snuff volatile ſpirit of vinegar up the noſtrils. Laſtly, in permanent head-achs, as in permanent vertigo, I have ſeen good effect by the uſe of mercurial ointment rubbed on the ſhaved head or about the throat, till a mild ſalivation commences, which by inflaming the membranes of the teeth may prevent their irritative ſympathy with thoſe of the cranium. Thus by inflaming the tendon, which is the cauſe of locked jaw, and probably by inflaming the wound, which is the cauſe of hydrophobia, thoſe diſeaſes may be cured, by diſuniting the irritative ſympathy between thoſe parts, which may not poſſeſs any ſenſitive ſympathy. This idea is well worth our attention.

Otalgia. Ear-ach is another diſeaſe occaſioned by the ſympathy of the membranes of the ear with thoſe which inveſt or ſurround a decaying tooth, as I have had frequent reaſon to believe; and is frequently relieved by filling the ear with tincture of opium. See Claſs I. 2. 4.

9. *Dolor humeri in hepatitide.* In the efforts of excluding the fæces and urine the muſcles of the ſhoulders are exerted to compreſs the air in the lungs, that the diaphragm may be preſſed down. Hence the diſtention of the tendons or fibres of theſe muſcles is aſſociated with the diſtention of the tendons or fibres

of the diaphragm; and when the latter are pained by the enlargement or heat of the inflamed liver, the former ſympathize with them. Sometimes but one ſhoulder is affected, ſometimes both; it is probable that many other pains, which are termed rheumatic, have a ſimilar origin, viz. from ſenſitive aſſociations.

As no inflammation is produced in conſequence of this pain of the ſhoulder, it ſeems to be owing to inaction of the membranous part from defect of the ſenſorial power of aſſociation, of which the primary link is the inflamed membrane of the liver; which now expends ſo much of the ſenſorial power in general by its increaſed action, that the membranes about the ſhoulder, which are links of aſſociation with it, become deprived of their uſual ſhare, and conſequently fall into torpor.

10. *Torpor pedum in eruptione variolarum.* At the commencement of the eruption of the ſmall-pox, when the face and breaſt of children are very hot, their extremities are frequently cold. This I aſcribe to ſenſitive aſſociation between the different parts of the ſkin; whence when a part acts too violently, the other part is liable to act too weakly; and the ſkin of the face being affected firſt in the eruption of the ſmall-pox, the ſkin of the feet becomes cold in conſequence by reverſe ſympathy.

M. M. Cover the feet with flannel, and expoſe the face and boſom to cool air, which in a very ſhort time both warms the feet and cools the face; and hence what is erroneouſly called a raſh, but which is probably a too haſty eruption of the ſmall-pox, diſappears; and afterwards fewer and more diſtinct eruptions of the ſmall-pox ſupervene.

11. *Teſtium dolor nephriticus.* The pain and retraction of the teſticle on the ſame ſide, when there is a ſtone in the ureter, is to be aſcribed to ſenſitive aſſociation; whether the connecting cauſe be a branch of the ſame nerve, or from membranes, which have been frequently affected at the ſame time.

12. *Dolor digiti minimi ſympatheticus.* When any one accidentally ſtrikes his elbow againſt any hard body, a tingling pain runs down to the little finger end. This is owing to ſenſitive aſſociation of motions by means of the ſame branch of a nerve, as in hemicrania from a decaying tooth the pain is owing to the ſenſitive aſſociation of tendons or membranes.

13. *Dolor brachii in hydrope pectoris.* The pain in the left arm which attends ſome dropſies of the cheſt, is explained in Sect XXIX. 5. 2. 10. which reſembles the pain of the little finger from a percuſſion of the nerve at the elbow in the preceding article. A numbneſs of this kind is produced over the whole leg, when the crural nerve is much compreſſed by ſitting for a time with one leg croſſed over the other.

Mr. ——, about ſixty, had for two years been affected with difficulty of reſpiration on any exertion, with pain about the ſternum, and of his left arm; which laſt was more conſiderable than is uſual in dropſy of the cheſt; ſome months ago the pain of his arm, after walking a mile or two, became exceſſive, with coldneſs and numbneſs; and on the next day the back of the hand, and a part of the arm ſwelled, and became inflamed, which relieved the pain; and was taken for the gout, and continued ſeveral days. He after ſome months became dropſical both in reſpect to his cheſt and limbs, and was ſix or ſeven times perfectly relieved by one dram of ſaturated tincture of digitalis, taken two or three times a day for a few days in a glaſs of peppermint water. He afterwards breathed oxygen gas undiluted, in the quantity of ſix or eight gallons a day for three or four weeks without any effect, and ſunk at length from general debility.

In this inſtructive caſe I imagine the preſſure or ſtimulus of one part of the nerve within the cheſt cauſed the other part, which ſerves the arm, to become torpid, and conſequently cold by ſympathy; and that the inflammation was the conſequence of the previous torpor and coldneſs of the arm, in the ſame manner as the ſwelling and inflammation of the cheek in tooth-ach, in the firſt ſpecies of this genus; and that many rheumatic inflammations are thus produced by ſympathy with ſome diſtant part.

14. *Diarrhœa a dentitione.* The diarrhœa, which frequently attends dentition, is the conſequence of

indigeſtion; the aliment acquires chemical changes, and by its acidity acts as a cathartic; and changes the yellow bile into green, which is evacuated along with indigeſted parts of the coagulum of milk. The indigeſtion is owing to the torpor of the ſtomach and inteſtines cauſed by their aſſociation with the membranes of the gums, which are now ſtimulated into great exertion with pain; both which contribute to expend the general quantity of ſenſorial power, which belongs to this membranous aſſociation; and thus the ſtomach and inteſtines act with leſs than their natural energy. This is generally eſteemed a favourable ſymptom in difficult dentition, as the pain of the alveolar membranes exhauſts the ſenſorial power without producing convulſions for its relief. See Claſs I. 1. 4. 5. And the diarrhœa ceaſes, as the tooth advances.

ORDO II.

Decreaſed Aſſociate Motions.

GENUS III.

Catenated with Voluntary Motions.

SPECIES.

2. *Titubatio linguæ.* Impediment of ſpeech is owing to the aſſociations of the motions of the organs of ſpeech being interrupted or diſſevered by ill-employed ſenſation or ſenſitive motions, as by awe, baſhfulneſs, ambition of ſhining, or fear of not ſucceeding, and the perſon uſes voluntary efforts in vain to regain the broken aſſociations, as explained in Sect. XVII. 1. 10. and XVII. 2. 10.

The broken aſſociation is generally between the firſt conſonant and the ſucceeding vowel; as in endeavouring to pronounce the word parable, the p is voluntarily repeated again and again, but the remainder of the word does not follow, becauſe the aſſociation between it and the next vowel is diſſevered.

M. M. The art of curing this defect is to cauſe the ſtammerer to repeat the word, which he finds difficult to ſpeak, eight or ten times without the initial letter, in a ſtrong voice, or with an aſpirate before it, as arable, or harable; and at length to ſpeak it very ſoftly with the initial letter p, parable. This ſhould be practiſed for weeks or months upon every word, which the ſtammerer heſitates in pronouncing.

To this ſhould be added much commerce with mankind, in order to acquire a careleſſneſs about the opinions of others.

2. *Chorea St. Viti.* In the St. Vitus's dance the patient can at any time lie ſtill in bed, which ſhews the motions not to be convulſive; and he can at different times voluntarily exert every muſcle of his body; which evinces, that they are not paralytic. In this diſeaſe the principal muſcle in any deſigned motions obeys the will; but thoſe muſcles, whoſe motions were aſſociated with the principal one, do not act; as their aſſociation is diſſevered, and thus the arm or leg is drawn outward, or inward, or backward, inſtead of upward or forward, with various geſticulations exactly reſembling the impediment of ſpeech.

This diſeaſe is frequently left after the itch has been too haſtily cured. See Convulſio dolorifica, Claſs III. 1. 1. 6. A girl about eighteen, after wearing a mercurial girdle to cure the itch, acquired the Chorea St. Viti in ſo univerſal a manner, that her ſpeech became affected as well as her limbs; and there was evidently a diſunion of the common trains of ideas; as the itch was ſtill among the younger children of the family, ſhe was adviſed to take her ſiſter as a bed-fellow, and thus received the itch again; and the dance of St. Vitus gradually ceaſed. See Claſs II. 1. 5. 6.

M. M. Give the patient the itch again. Calomel a grain every night, or ſublimate a quarter of a grain twice a day for a fortnight. Steel. Bark. Warm-bath. Cold-bath. Opium. Venſection once at the beginning of the diſeaſe. Electricity. Perpetual ſlow and repeated efforts to move each limb in the deſigned direction, as in the titubatio linguæ above deſcribed.

3. *Riſus.* Laughter is a perpetual interruption of voluntary exertion by the interpoſition of pleaſurable ſenſation; which not being checked by any important conſequences riſes into pain, and requires to be relieved or moderated by the frequent repetition of voluntary exertion. See Sect. XXXIV. 1. 4. and Claſs III. 1. 1. 4. and IV. 1. 3. 3.

4. *Tremor ex irá.* The trembling of the limbs from anger. The interruption of the voluntary aſſociations of motions by anger, originates from too great a part of the ſenſorial power being exerted on the organs of ſenſe; whence the muſcles, which ought to ſupport the body upright, are deprived of their due quantity, and tremble from debility. See Claſs III. 2. 1. 1.

5. *Rubor ex irá.* Redneſs from anger. Anger is an exceſs of averſion, that is of voluntarity not yet employed. It is excited by the pain of offended pride; when it is employed it becomes outrage,

cruelty, inſanity. The cutaneous capillaries, eſpecially thoſe of the face, are more mobile, that is, more eaſily excited into increaſed action, or more eaſily become torpid, from leſs variation of ſenſorial power, than any other parts of the ſyſtem, which is owing to their being perpetually ſubject to the viciſſitudes of heat and cold, and of extenſion and corrugation. Hence, when an exceſs of voluntarity exiſts without being immediately expended in the actions of the large muſcles, the capillary arteries and glands acquire more energetic action, and a fluſhed ſkin is produced, with increaſed ſecretion of perſpirable matter, and conſequent heat, owing to the pauſe or interruption of voluntary action; and thus the actions of theſe cutaneous veſſels become aſſociated between the iraſcent ideas and iraſcent muſcular actions, which are thus for a time interrupted.

6. *Rubor criminati.* The bluſhing of accuſed people, whether guilty or not, appears to be owing to circumſtances ſimilar to that of anger; for in theſe ſituations there is always a ſudden voluntarity, or wiſh, of clearing their characters ariſes in the mind of the accuſed perſon; which, before an opportunity is given for it to be expended on the large muſcles, influences the capillary arteries and glands, as in the preceding article. Whence the increaſed actions of the capillaries, and the conſequent redneſs and heat, become exerted between the voluntary ideas of ſelf-defence, and the muſcular actions neceſſary for that

purpoſe; which laſt are thus for a time interrupted or delayed.

Even in the bluſh of modeſty or baſhfulneſs there is a ſelf-condemnation for ſome ſuppoſed defect or indecorum, and a ſudden voluntarity, or wiſh, of ſelf-defence; which not being expended in actions of the larger muſcles excites the capillaries into action; which in theſe ſubjects are more mobile than in others.

The bluſh of young girls on coming into an aſſembly room, where they expect their dreſs, and ſteps, and manner to be examined, as in dancing a minuet, may have another origin; and may be conſidered as a hot fit of returning confidence, after a previous cold fit of fear.

7. *Tarditas paralytica.* By a ſtroke of the palſy or apoplexy it frequently happens, that thoſe ideas, which were aſſociated in trains, whoſe firſt link was a voluntary idea, have their connection diſſevered; and the patient is under the neceſſity by repeated efforts ſlowly to renew their aſſociations. In this ſituation thoſe words, which have the feweſt other words aſſociated with them, as the proper names of perſons or places, are the moſt difficult to recollect. And in thoſe efforts of recollection the word oppoſite to the word required is often produced, as hot for cold, winter for ſummer, which is owing to our aſſociating our ideas of things by their oppoſites as well as by their ſimilitudes, and in ſome inſtances perhaps

more frequently, or more forcibly. Other paralytic patients are liable to give wrong names to external objects, as uſing the word pigs for ſheep, or cows for horſes; in this caſe the aſſociation between the idea of the animal and the name of it is diſſevered; but the idea of the claſs or genus of the thing remains; and he takes a name from the firſt of the ſpecies, which preſents itſelf, and ſometimes can correct himſelf, till he finds the true one.

8. *Tarditas ſenilis.* Slowneſs of age. The difficulty of aſſociating ideas increaſes with our age; as may be obſerved from old people forgetting the buſineſs of the laſt hour, unleſs they impreſs it ſtrongly, or by frequent repetition, though they can well recollect the tranſactions of their youth. I ſaw an elderly man, who could reaſon with great clearneſs and preciſion and in accurate language on ſubjects, which he had been accuſtomed to think upon; and yet did not know, that he had rang the bell by his fire-ſide in one minute afterwards; nor could then recollect the object he had wanted, when his ſervant came.

Similar to this is the difficulty which old people experience in learning new bodily movements, that is, in aſſociating new muſcular actions, as in learning a new trade or manufactury. The trains of movements, which obey volition, are the laſt which we acquire; and the firſt, which are diſaſſociated.

ORDO II.

Decreaſed Aſſociate Motions.

GENUS IV.

Catenated with External Influences.

As the diſeaſes, which obey ſolar or lunar periods, commence with torpor or inactivity, ſuch as the cold paroxyſms of fevers, the torpor and conſequent pain of hemicrania, and the pains which precede the fits of epilepſy and convulſion, it would ſeem, that theſe diſeaſes are more generally owing to the diminution than to the exceſs of ſolar or lunar gravitation; as the diſeaſes, which originate from the influence of the matter of heat, are much more generally in this country produced by the defect than by the exceſs of that fluid.

The periodic returns of ſo many diſeaſes coincide with the diurnal, monthly, and annual rounds of time; that any one, who would deny the influence of the ſun and moon on the periods of quotidian, tertian, and quartan fevers, muſt deny their effect on the tides, and on the ſeaſons. It has generally been believed, that ſolar and lunar effect was exerted on the blood; which was thus rendered more or leſs ſtimulant to the ſyſtem, as deſcribed in Sect. XXXII. 6. But as the fluid matter of gravitation permeates and covers all things, like the fluid matter of heat; I am induced to believe, that gravitation acts in its medium ſtate rather as a cauſa ſine quâ non of animal motion, like heat; which may diſorder the ſyſtem chemically or mechanically, when it is diminiſhed; but may nevertheleſs ſtimulate it, when increaſed, into animal exertion.

Without heat and motion, which ſome philoſophers ſtill believe to be the ſame thing, as they ſo perpetually appear together, the particles of matter would attract and move towards each other, and the whole univerſe freeze or coaleſce into one ſolid maſs. Theſe therefore counteract the gravitation of bodies to one centre; and not only prevent the planets from falling into the ſun, but become either the efficient cauſes of vegetable and animal life, or the cauſes without which life cannot exiſt; as by their means the component particles of matter are enabled to ſlide over each other with all the various degrees of fluidity and repulſion.

As the attraction of the moon countervails or diminiſhes the terrene gravitation of bodies on the ſurface of the earth, a tide riſes on that ſide of the earth which is turned towards the moon; and follows it, as the earth revolves. Another tide is raiſed at the ſame time on the oppoſite ſide of the revolving earth; which is owing to the greater centrifugal motion of that ſide of the earth, which counteracts the gravitation of bodies near its ſurface. For the earth and moon may be conſidered as two cannon balls of different ſizes held together by a chain, and revolving once a month round a common center of gravity between them, near the earth's ſurface; at the ſame time that they perform their annual orbits round the ſun. Whence the centrifugal force of that ſide of the earth, which is fartheſt from this center of motion, round which the earth and moon monthly revolve, is conſiderably greater, than the centrifugal force of that ſide of the earth, which is neareſt it; to which ſhould be added, that this centrifugal force not only contributes to diminiſh the terrene gravitation of bodies on the earth's ſurface on that ſide furtheſt from this center of motion, but alſo to increaſe it on that ſide, which is neareſt it.

Another circumſtance, which tends to raiſe the tide on the part of the earth's ſurface, which is moſt diſtant from the moon, is, that the attraction of the moon is leſs on that part of the ocean, than it is on the other parts of the earth. Thus the moon may be ſuppoſed to attract the water on the ſide of the earth neareſt it with a power equal to three; and to attract the central parts of the earth with a power equal to two; and the water on the part of the earth moſt diſtant from the moon with a power only equal to one. Hence on the ſide of the earth moſt diſtant from the moon, the moon's attraction is leſs, and the centrifugal force round their common centre of motion is greater; both which contribute to raiſe the tides on that ſide of the earth. On the ſide of the earth neareſt the moon, the moon's attraction is ſo much greater as to raiſe the tides; though the centrifugal force of the ſurface of the earth round their common centre of motion in ſome degree oppoſes this effect.

On theſe accounts, when the moon is in the zenith or nadir, the gravitation of bodies on the earth's ſurface will be greateſt at the two oppoſite quadratures; that is, the greateſt gravitation of bodies on the earth's ſurface towards her center during the lunar day is about ſix hours and an half after the ſouthing, or after the northing of the moon.

Circumſtances ſimilar to theſe, but in a leſs degree, muſt occur in reſpect to the ſolar influence on terreſtrial bodies; that is, there muſt be a diminution of the gravity of bodies near the earth's ſurface at noon, when the ſun is over them; and alſo at midnight from the greater centrifugal force of that ſide of the earth, which is moſt diſtant from the center, round which the earth moves in her annual orbit, than on the ſide neareſt that center. Whence it likewiſe follows, that the gravitation of bodies towards the earth is greateſt about ſix hours after noon, and after midnight.

Now when the ſun and moon have their united gravitation on the ſame ſide of the earth, as at the new moon; or when the ſolar attraction coincides with the greater centrifugal motion of that ſide of the earth, which is furtheſt diſtant from the moon, as at the full moon; and when this happens about noon or midnight, the gravitation of terrene bodies towards the earth will be greater about ſix hours after noon, and after midnight, than at any other part of the lunar period; becauſe the attraction of both theſe luminaries is then exerted on thoſe ſides of the earth over which they hang, which at other times of the month are more or leſs exerted on other parts of it.

Laſtly, as heat and motion counteract the gravitation of the particles of bodies to each other, and hence become either the efficient cauſes of vegetable and animal life, or the cauſes without which life cannot exiſt, it ſeems to follow, that when our gravitation towards the earth's center is greateſt, the powers of life ſhould be the leaſt; and hence that thoſe diſeaſes, which begin with torpor, ſhould occur about ſix hours after the ſolar or lunar noon, or about ſix hours after the ſolar or lunar midnight; and this moſt frequently about ſix hours after or before the new or full moon; and eſpecially when theſe happen at noon or at midnight; or laſtly, according to the combination of theſe powers in diminiſhing or increaſing the earth's attraction to bodies on its ſurface.

The returns or exacerbations of many fevers, both irritative and inflammatory, about ſix in the evening, and of the periodic cough deſcribed in Sect. XXXVI. 3. 9. countenance this theory. Tables might be made out to ſhew the combined powers of the ſun and moon in diminiſhing the gravitation of bodies on the earth's ſurface, at every part of their diurnal, monthly, and annual periods; and which might facilitate the elucidation of this ſubject. But I am well aware of the difficulty of its application to diſeaſes, and hope theſe conjectures may induce others to publiſh more numerous obſervations, and more concluſive reaſonings.

SPECIES.

1. *Somni periodus.* The periods of ſleeping and of waking are ſhortened or prolonged by ſo many other circumſtances in animal life, beſides the minute difference between diurnal and nocturnal ſolar gravitation, that it can ſcarcely be aſcribed to this influence. At the ſame time it is curious to obſerve, that vegetables in reſpect to their times of ſleeping more regularly obſerve the hour of the day, than the preſence or abſence of light, or of heat, as may be ſeen by conſulting the calendar of Flora. Botanic Garden, Part II. Canto 2. l. 165. note.

Some diſeaſes, which at firſt ſight might be ſuppoſed to be influenced by ſolar periods, ſeem to be induced by the increaſing ſenſibility of the ſyſtem to pain during our ſleeping hours; as explained in Sect. XVIII. 15. Of theſe are the fits of aſthma, of ſome epilepſies, and of ſome hæmoptoes; all which diſturb the patient after ſome hours ſleep, and are therefore to be aſcribed to the increaſe of our dormant ſenſibility. There may likewiſe be ſome doubt, whether the commencement of the pain of gout in the foot, as it generally makes its attack after ſleep, ſhould be aſcribed to the increaſed ſenſibility in ſleep, or to ſolar influence?

M. M. When aſthmatic or epileptic fits or hæmoptoe occur after a certain number of hours of ſleep, the patient ſhould be forcibly awakened before the expected time by an alarm clock, and drink a cup of chocolate or lemonade.—Or a grain of opium ſhould be given at going to bed.—In one caſe to prevent the too great increaſe of ſenſibility by ſhortening the time of ſleep; and in the other by increaſing the irritative motions, and expending by that means a part of the ſenſorial power.

2. *Studii inanis periodus.* Claſs III. 1. 2. 2. The cataleptic ſpaſm which preceded the reverie and ſomnambulation in the patient whoſe caſe is related in Sect. XIX. 2. occurred at exactly the ſame hour, which was about eleven in the morning for many weeks; till thoſe periods were diſturbed by large doſes of opium; and muſt therefore be referred to ſome effect of ſolar gravitation. In the caſe of Maſter A. Sect. XXXIV. 3. as the reverie began early in the morning during ſleep, there may be a doubt, whether this commenced with torpor of ſome organ catenated with ſolar gravitation; or was cauſed by the exiſtence of a previous torpid part, which only became ſo painful as to excite the exertions or reverie by the perpetual increaſe of ſenſibility during the continuance of ſleep, as in ſome fits of epilepſy, aſthma, and hæmoptoe mentioned in the preceding article.

3. *Hemicraniæ periodus.* Periods of hemicrania. Claſs IV. 2. 2. 8. The torpor and conſequent pain of ſome membranes on one ſide of the head, as over one eye, is frequently occaſioned by a decaying tooth, and is liable to return every day, or on alternate days

at ſolar or lunar periods. In this caſe large quantities of the bark will frequently cure the diſeaſe, and eſpecially if preceded by veneſection and a briſk cathartic; but if the offending tooth can be detected, the moſt certain cure is its extraction. Theſe partial head-achs are alſo liable to return at the greater lunar periods, as about once a month. Five drops from a two-ounce phial of a ſaturated ſolution of arſenic twice a day for a week or two have been ſaid to prevent the returns of this diſeaſe. See a Treatiſe on Arſenic by Dr. Fowler, of York. Strong errhines have alſo been recommended.

4. *Epilepſiæ dolorificæ periodus.* Claſs III. 1. 1. 8. The pain which induces after about an hour the violent convulſions or inſanity, which conſtitute the painful epilepſy, generally obſerve ſolar diurnal periods for four or five weeks, and are probably governed by ſolar and lunar times in reſpect to their greater periods; for I have obſerved that the daily paroxyſms, unleſs diſturbed by large doſes of opium, recur at very nearly the ſame hour, and after a few weeks the patients have recovered to relapſe again at the interval of a few months. But more obſervations are wanted upon this ſubject, which might be of great advantage in preventing the attacks of this diſeaſe; as much leſs opium given an hour before its expected daily return will prevent the paroxyſm, than is neceſſary to cure it, after it has commenced.

5. *Convulſionis dolorificæ periodus.* Claſs III. 1. 1. 6. The pains, which produce theſe convulſions, are generally left after rheumatiſm, and come on when the patients are become warm in bed, or have been for a ſhort time aſleep, and are therefore perhaps rather to be aſcribed to the increaſing ſenſibility of the ſyſtem during ſleep, than to ſolar diurnal periods, as in Species firſt and ſecond of this Genus.

6. *Tuſſis periodicæ periodus.* Periodic cough, Claſs IV. 2. 1. 9. returns at exact ſolar periods; that deſcribed in Sect. XXXVI. 3. 9. recurred about ſeven in the afternoon for ſeveral weeks, till its periods were diſturbed by opium, and then it recurred at eleven at night for about a week, and was then totally deſtroyed by opium given in very large quantities, after having been previouſly for a few days omitted.

7. *Catameniæ periodus.* Periods of menſtruation. The correſpondence of the periods of the catamenia with thoſe of the moon was treated of in Sect. XXXII. 6. and can admit of no more doubt, than that the returns of the tides are governed by lunar influence. But the manner in which this is produced, is leſs evident; it has commonly been aſcribed to ſome effect of the lunar gravitation on the circulating blood, as mentioned in Sect. XXXII. 6. But it is more analogous to other animal phenomena to ſuppoſe that the lunar gravitation immediately affects the ſolids by its influx or ſtimulus. Which we believe of the fluid ele-

ment of heat, in which we are equally immerſed; and of the electric fluid, which alſo ſurrounds and pervades us. See Sect. XXXVI. 2. 3.

If the torpor of the uterine veins, which induces the monthly periods of the catamenia, be governed by the increaſe of terrene gravitation; that is, by the deficiency of the counter-influence of ſolar and lunar gravitation; why does not it occur moſt frequently when the terrene gravitation is the greateſt, as about ſix hours after the new moon, and next to that at about ſix hours after the full moon? This queſtion has its difficulty; firſt, if the terrene gravitation be greateſt about ſix hours after the new moon, it muſt become leſs and leſs about the ſame time every lunar day, till the end of the firſt quarter, when it will be the leaſt; it muſt then increaſe daily till the full. After the full the terrene gravitation muſt again decreaſe till the end of the third quarter, when it will again be the leaſt, and muſt increaſe again till the new moon; that is, the ſolar and lunar counter-gravitation is greateſt, when thoſe luminaries are vertical, at the new moon, and full moon, and leaſt about ſix hours afterwards. If it was known, whether more menſtruations occur about ſix hours after the moon is in the zenith or nadir; and in the ſecond and fourth quarters of the moon, than in the firſt and third; ſome light would be thrown on this ſubject; which muſt in that reſpect wait for future obſervations.

Secondly, if the lunar influence produces a very ſmall degree of quieſcence, ſuppoſe of the uterine veins, at firſt; and if that recurs at certain periods, as of lunar days, or about 25 hours, even with leſs power to produce quieſcence than at firſt; yet the quieſcence will daily increaſe by the acquired habit acting at the ſame time, as explained in Sect. XII. 3. 3. till at length ſo great a degree of quieſcence will be induced as to cauſe the inaction of the veins of the uterus, and conſequent venous hæmorrhage. See Sect. XXXII. 6. Claſs I. 2. 1. 11. IV. 1. 4. 4. See the introduction to this Genus.

8. *Hæmorrhoidis periodus.* The periods of the piles depend on the torpor of the veins of the rectum, and are believed to recur nearly at monthly intervals. See Sect. XXVII. 2. and Claſs I. 2. 1. 6.

9. *Podagræ periodus.* The periods of gout in ſome patients recur at annual intervals, as in the caſe related above in Claſs IV. 1. 2. 15. in which the gouty paroxyſm returned for three ſucceſſive years on nearly the ſame day of the month. The commencement of the pain of each paroxyſm is generally a few hours after midnight, and may thence either be induced by diurnal ſolar periods, or by the increaſing ſenſibility during ſleep, as mentioned in the firſt ſpecies of this genus.

10. *Eryſipelatis periodus.* Some kinds of eryſipelas which probably originate from the aſſociation of the cutaneous veſſels with a diſeaſed liver, occur at monthly periods, like the hæmorrhois or piles; and

others at annual periods like the gout; as a torpor of ſome part I ſuppoſe always precedes the eryſipelatous inflammation, the periods ſhould accord with the increaſing influence of terrene gravitation, as deſcribed in the introduction to this Genus, and in Species the ſeventh of it. Other periods of diſeaſes referable to ſolar and lunar influence are mentioned in Sect. XXXVI. and many others will probably be diſcovered by future obſervations.

11. *Febrium periodus.* Periods of fevers. The commencement of the cold fits of intermittent fevers, and the daily exacerbations of other fevers, ſo regularly recur at diurnal ſolar or lunar periods, that it is impoſſible to deny their connection with gravitation; as explained in Sect. XXXVI. 3. Not only theſe exacerbations of fever, and their remiſſions, obey the diurnal ſolar and lunar periods; but the preparatory circumſtances, which introduce fevers, or which determine their criſiſes, appear to be governed by the parts of monthly lunar periods, and of ſolar annual ones. Thus the variolous fever in the natural ſmall-pox commences on the 14th day, and in the inoculated ſmall-pox on the ſeventh day. The fever and eruption in the diſtinct kind take up another quarter of a lunation, and the maturation another quarter.

The fever, which is termed canine madneſs, or hydrophobia, is believed to commence near the new or full moon; and, if the cauſe is not then great enough to bring on the diſeaſe, it ſeems to acquire ſome ſtrength, or to lie dormant, till another, or perhaps more powerful lunation calls it into action. In the ſpring, about three or four years ago, a mad dog very much worried one ſwine confined in a ſty, and bit another in the ſame ſty in a leſs degree; the former became mad, refuſed his meat, was much convulſed, and died in about four days; this diſeaſe commenced in about a month after the bite. The other ſwine began to be ill about a month after the firſt, and died in the ſame manner.

ORDO III.

Retrograde Aſſociate Motions.

GENUS I.

Catenated with Irritative Motions.

THOSE retrograde aſſociate motions, the firſt links of which are catenated with irritative motions, belong to this genus. All the retrograde motions are conſequent to debility, or inactivity, of the organ; and therefore properly belong to the genera of decreaſed actions both in this and the former claſſes.

SPECIES.

1. *Diabœtes irritata.* When the abſorbents of the inteſtines are ſtimulated too ſtrongly by ſpirit of wine, as in the beginning of drunkenneſs, the urinary abſorbents invert their motions. The ſame

happens

happens from worms in the inteſtines. In other kinds of diabetes may not the remote cauſe be the too ſtrong action of the cutaneous abſorbents, or of the pulmonary ones? May not in ſuch caſes oil externally or internally be of ſervice? or warm bathing for an hour at a time? In hyſteric inverſions of motion is ſome other part too much ſtimulated? or pained from the want of ſtimulus?

2. *Sudor frigidus in aſthmate.* The cauſe of the paroxyſms of humoral aſthma is not well underſtood; I ſuppoſe it to be owing to a torpidity or inaction of the abſorbents belonging to the pulmonary veſſels, as happens probably to other viſcera at the commencement of intermittent fevers, and to a conſequent accumulation of fluids in them; which at length producing great irritation or uneaſy ſenſation cauſes the violent efforts to produce the abſorption of it. The motions of the cutaneous abſorbent veſſels by their aſſociation with thoſe of the pulmonary ones become retrograde, and effuſe upon the ſkin a fluid, which is ſaid to be viſcid, and which adheres in drops.

A few days ago I ſaw a young man of delicate conſtitution in what was called a fit of the aſthma; he had about two months before had a peripneumony, and had been ever ſince ſubject to difficult reſpiration on exertion, with occaſional palpitation of his heart. He was now ſeized about eight at night after ſome exertion of mind in his buſineſs with cold extremities, and difficulty of breathing. He gradually became worſe, and in about half an hour, the palpitation of his heart and difficult reſpiration were very alarming; his whole ſkin was cold and pale, yet he did not ſhudder as in cold paroxyſm of fever; his tongue from the point to the middle became as cold as his other extremities, with cold breath. He ſeemed to be in the act of dying, except that his pulſe continued equal in time, though very quick. He loſt three ounces of blood, and took ten drops of laudanum with muſk and ſalt of hartſhorn, and recovered in an hour or two without any cold ſweat.

There being no cold ſweat ſeems to indicate, that there was no accumulation of ſerous fluid in the lungs; and that their inactivity, and the coldneſs of the breath, was owing to the ſympathy of the air-cells with ſome diſtant part. There was no ſhuddering produced, becauſe the lungs are not ſenſible to heat and cold; as any one may obſerve by going from a warm room into a froſty air, and the contrary. So the ſteam of hot tea, which ſcalds the mouth, does not affect the lungs with the ſenſation of heat. I was induced to believe, that the whole cold fit might be owing to ſuppuration in ſome part of the cheſt; as the general difficulty of breathing ſeemed to be increaſed after a few days with pulſe of 120, and other ſigns of empyema. Does the cold ſweat, and the occurrence of the fits of aſthma after ſleep, diſtinguiſh the humoral aſthma from the cold paroxyſm of intermittents, or which attends ſuppuration, or which precedes inflammation?—I heard a few weeks afterwards, that he ſpit up much matter at the time he died.

3. *Diabætes a timore.* The motions of the abſorbent veſſels of the neck of the bladder become inverted by their conſent with thoſe of the ſkin; which are become torpid by their reverſe ſympathy with the painful ideas of fear, as in Sect. XVI. 8. 1. whence there is a great diſcharge of pale urine, as in hyſteric diſeaſes.

The ſame happens from anxiety, where the painful ſuſpenſe is continued, even when the degree of fear is ſmall; as in young men about to be examined for a degree at the univerſities the frequency of making water is very obſervable. When this anxiety is attended with a ſleepleſs night, the quantity of pale urine is amazingly great in ſome people, and the micturition very frequent.

M. M. Opium. Joy. Conſolations of friendſhip.

4. *Diarrhœa a timore.* The abſorbent veſſels of the inteſtines invert their motions by direct conſent with the ſkin; hence many liquid ſtools as well as much pale urine are liable to accompany continued fear, along with coldneſs of the ſkin. The immediate cauſe of this is the decreaſed ſenſorial power of aſſociation, which intervenes between the actions of the abſorbents of the cold ſkin, and thoſe of the inteſtinal abſorbents; the motions of the latter become on that account weakened and at length retrograde.

grade. The remote cauſe is the torpor of the veſſels of the ſkin catenated with the pain of fear, as explained in Sect. XVI. 8. 1.

The capillaries of the ſkin conſent more generally by direct ſympathy with thoſe of the lower inteſtines, and of the bladder; but by reverſe ſympathy more generally with thoſe of the ſtomach and upper inteſtines. As appears in fevers, where the hot ſkin accompanies indigeſtion of the ſtomach; and in diarrhœas attended with cold extremities.

The remote cauſe is the torpor of the ſkin owing to its reverſe ſympathy with the painful ſenſual motions, or ideas, of fear; which are now actuated with great energy, ſo as to deprive the ſecond link of aſſociated motions of their due ſhare of ſenſorial power. It is alſo probable, that the pain of fear itſelf may contribute to exhauſt the ſenſorial power, even when it produces no muſcular action. See Claſs IV. 2. 2.

5. *Pallor et tremor a timore.* A retrograde action of the capillaries of the ſkin producing paleneſs, and a torpor of the muſcular fibres of the limbs occaſioning trembling, are cauſed by their reverſe aſſociations with the ideas or imaginations of fear; which are now actuated with violent energy, and accompanied with great pain. The cauſe of theſe aſſociations is explained in Sect. XVI. 8. 1.

Theſe torpid actions of the capillaries and muſcles of the limbs are not cauſed immediately by the painful ſenſation of fear; as in that caſe they would have been increaſed and not decreaſed actions, as occurs in anger; where the painful volition increaſes the actions of the capillaries, exciting a bluſh and heat of the ſkin. Whence we may gain ſome knowledge of what is meant by depreſſing and exciting paſſions; the former conſiſting of ideas attended with pain, which pain occaſions no muſcular actions, like the pain of cold head-ach; the latter being attended with volitions, and conſequent muſcular exertions.

That is, the pain of fear, and the pain of anger, are produced by the exertion of certain ideas, or motions of certain nerves of ſenſe; in the former caſe, the painful ſenſation of fear produces no muſcular actions, yet it exhauſts or employs ſo much ſenſorial power, that the whole ſyſtem acts more feebly, or becomes retrograde; but ſome parts of it more ſo than others, according to their early aſſociations deſcribed in Sect. XVI. 8. 1. hence the tremor of the limbs, palpitation of heart, and even ſyncope. In anger the painful volition produces violent muſcular actions; but if previous to theſe any deliberation occurs, a fluſhed countenance ſometimes, and a red ſkin, are produced by this ſuperabundance of volition exerted on the arterial ſyſtem; but at other times the ſkin becomes pale, and the legs tremble, from the exhauſtion or expenditure of the ſenſorial power by the painful volitions of anger on the organs of ſenſe, as by the painful ſenſations of fear above mentioned.

Where the paſſion of fear exiſts in a great degree, it exhauſts or expends ſo much ſenſorial power, either ſimply by the pain which attends it, or by the violent and perpetual excitement of the terrific imaginations or ideas, that not only a cold and pale ſkin, but a retrograde motion of the cutaneous abſorbents occurs, and a cold ſweat appears upon the whole ſurface of the body, which probably ſometimes increaſes pulmonary abſorption; as in Claſs II. 1. 6. 4. and as in the cold ſweats, which attend the paroxyſms of humoral aſthma. Hence anxiety, which is a continued pain of fear, ſo univerſally debilitates the conſtitution as to occaſion a lingering death; which happens much more frequently than is uſually ſuppoſed; and theſe victims of continued anxiety are ſaid to die of a broken heart. Other kinds of paleneſs are deſcribed in Claſs I. 2. 2. 2.

M. M. Opium. Wine. Food. Joy.

6. *Palpitatio cordis a timore.* The palpitation of the heart from fear is owing to the weak action of it, and perhaps ſometimes to the retrograde exertion of the ventricules and auricles; becauſe it ſeems to be affected by its aſſociation with the capillaries, the actions of which, with thoſe of the arteries and veins, conſtitute one great circle of aſſociate motions. Now when the capillaries of the ſkin become torpid, coldneſs and paleneſs ſucceed; and with theſe are aſſociated the capillaries of the lungs, whence difficult reſpiration; and with theſe the weak and retrograde

actions of the heart. At the ſame time the abſorbents of the ſkin, and of the bladder, and of the inteſtines, ſometimes become retrograde, and regurgitate their contents; as appears by the pale urine in large quantities, which attends hyſteric complaints along with this palpitation of the heart; and from the cold ſweats, and diarrhœa; all which, as well as the hyſteric complaints, are liable to be induced or attended by fear.

When fear has ſtill more violently affected the ſyſtem, there have been inſtances where ſyncope, and ſudden death, or a total ſtoppage of the circulation, have ſucceeded: in theſe laſt caſes, the pain of fear has employed or exhauſted the whole of the ſenſorial power, ſo that not only thoſe muſcular fibres generally exerted by volition ceaſe to act, whence the patient falls down; and thoſe, which conſtitute the organs of ſenſe, whence ſyncope; but laſtly thoſe, which perform the vital motions, become deprived of ſenſorial power, and death enſues. See Claſs I. 2. 1. 4. and I. 2. 1. 10. Similar to this in ſome epileptic fits the patient firſt ſuddenly falls down, without even endeavouring to ſave himſelf by his hands before the convulſive motions come on. In this caſe the great exertion of ſome ſmall part in conſequence of great irritation or ſenſation exhauſts the whole ſenſorial power, which was lodged in the extremities of the locomotive nerves, for a ſhort time, as in ſyncope; and as ſoon as theſe muſcles are again ſupplied, convulſions ſupervene to relieve the painful ſenſation. See Claſs III. 1. 1. 7.

7. *Abortio a timore.* Women miſcarry much more frequently from a fright, than from bodily injury. A torpor or retrograde motion of the capillary arteries of the internal uterus is probably the immediate cauſe of theſe miſcarriages, owing to the aſſociation of the actions of thoſe veſſels with the capillaries of the ſkin, which are rendered torpid or retrograde by fear. By this contraction of the uterine arteries, the fine veſſels of the placenta, which are inſerted into them, are detruded, or otherwiſe ſo affected, that the placenta ſeparates at this time from the uterus, and the fetus dies from want of oxygenation. A ſtrong young woman, in the fifth or ſixth month of her pregnancy, who has ſince borne many children, went into her cellar to draw beer; one of the ſervant boys was hid behind a barrel, and ſtarted out to ſurpriſe her, believing her to be the maid-ſervant; ſhe began to flood immediately, and miſcarried in a few hours. See Sect. XXXIX. 6. 5. and Claſs I. 2. 1. 14.

8. *Hyſteria a timore.* Some delicate ladies are liable to fall into hyſteric fits from ſudden fright. The periſtaltic motions of the bowels and ſtomach, and thoſe of the œſophagus, make a part of the great circle of irritative motions with thoſe of the ſkin, and many other membranes. Hence when the cutaneous veſſels become torpid from their reverſe ſympathy with the painful ideas of fear; theſe of the bowels, and ſtomach, and œſophagus, become firſt torpid by direct ſympathy with thoſe of the ſkin, and then feebly and

ineffectually invert the order of their motions, which conſtitutes a paroxyſm of the hyſteric diſeaſe. See Claſs I. 3. 1. 10. Theſe hyſteric paroxyſms are ſometimes followed by convulſions, which belong to Claſs III. as they are exertions to relieve pain; and ſometimes by death. See Species 9 of this Genus, and Claſs I. 2. 1. 4.

Indigeſtion from fear is to be aſcribed in the ſame manner to the torpor of the ſtomach, owing to its aſſociation with the ſkin. As in Claſs IV. 1. 2. 5. IV. 2. 1.

ORDO III.

Retrograde Aſſociate Motions.

GENUS II.

Catenated with Senſitive Motions.

SPECIES.

1. *Nauſea idealis.* Nauſea from diſguſtful ideas, as from nauſeous ſtories, or diſguſtful ſights, or ſmells, or taſtes, as well as vomiting from the ſame cauſes, conſiſts in the retrograde actions of the lymphatics of the throat, and of the œſophagus, and ſtomach; which are aſſociated with the diſguſtful ideas, or ſenſual motions of ſight, or hearing, or ſmell, or taſte; for as theſe are decreaſed motions of the lymphatics, or of the œſophagus, or ſtomach, they cannot immediately

be excited by the ſenſorial power of painful ſenſation, as in that caſe they ought to be increaſed motions. So much ſenſorial power is employed for a time on the diſguſtful idea, or expended in the production of inactive pain, which attends it, that the other parts of the aſſociated chain of action, of which this diſguſtful idea is now become a link, are deprived of their accuſtomed ſhare; and therefore firſt ſtop, and then invert their motions. Owing to deficiency of ſenſorial power, as explained more at large in Sect. XXXV. 1. 3.

2. *Nauſea a conceptu.* The nauſea, which pregnant women are ſo ſubject to during the firſt part of geſtation, is owing to the reverſe ſympathy between the uterus and ſtomach, ſo that the increaſed action of the former, excited by the ſtimulus of the growing embryon, which I believe is ſometimes attended with ſenſation, produces decreaſed actions of the latter with the diſagreeable ſenſation of ſickneſs with indigeſtion and conſequent acidity. When the fetus acquires ſo much muſcular power as to move its limbs, or to turn itſelf, which is called quickening, this ſickneſs of pregnancy generally ceaſes.

M. M. Calcined magneſia. Rhubarb. Half a grain of opium twice a day. Recumbent poſture on a ſofa.

3. *Vomitio vertiginoſa.* Sea-ſickneſs, the irritative motions of viſion, by which we balance ourſelves, and preſerve our perpendicularity, are diſturbed by the indiſtinctneſs of their objects; which is either owing

to the ſimilarity of them, or to their diſtance, or to their apparent or unuſual motions. Hence theſe irritative motions of viſion are exerted with greater energy, and are in conſequence attended with ſenſation; which at firſt is agreeable, as when children ſwing on a rope; afterwards the irritative motions of the ſtomach, and of the abſorbent veſſels, which open their mouths into it, become inverted by their aſſociations with them by reverſe ſympathy.

For the action of vomiting, as well as the diſagreeable ſenſation of ſickneſs, are ſhewn to be occaſioned by defect of the ſenſorial power; which in this caſe is owing to the greater expenditure of it by the ſenſe of viſion. On the ſame account the vomiting, which attends the paſſage of a ſtone through the ureter, or from an inflammation of the bowels, or in the commencement of ſome fevers, is cauſed by the increaſed expenditure of the ſenſorial power by the too great action of ſome links of the aſſociations of irritative motions; and there being in conſequence a deficiency of the quantity required for other links of this great catenation.

It muſt be obſerved, that the expenditure of ſenſorial power by the retinas of the eyes is very great; which may be eſtimated by the perpetual uſe of thoſe organs during our waking hours, and during moſt of our ſleeping ones; and by the large diameters of the two optic nerves, which are nearly the ſize of a quill, or equal to ſome of the principal nerves, which ſerve the limbs.

4. *Vomitio a calculo in uretere.* The action of vomiting in conſequence of the increaſed or decreaſed actions of the ureter, when a ſtone lodges in it. The natural actions of the ſtomach, which conſiſt of motions ſubject to intermitted irritations from the fluids, which paſs through it, are aſſociated with thoſe of the ureter; and become torpid, and conſequently retrograde, by intervals, when the actions of the ureter becomes torpid owing to previous great ſtimulus from the ſtone it contains; as appears from the vomiting exiſting when the pain is leaſt. When the motions of the ureter are thus leſſened, the ſenſorial power of aſſociation, which ought to actuate the ſtomach along with the ſenſorial power of irritation, ceaſes to be excited into action; and in conſequence the actions of the ſtomach become leſs energetic, and in conſequence retrograde.

For as vomiting is a decreaſed action of the ſtomach, as explained in Sect. XXXV. 1. 3. it cannot be ſuppoſed to be produced by the pain of gravel in the ureter alone, as it ſhould then be an increaſed action, not a decreaſed one.

The perpetual vomiting in ileus is cauſed in like manner by the defective excitement of the ſenſorial power of aſſociation by the bowel, which is torpid during the intervals of pain; and the ſtomach ſympathizes with it. See Enteritis, Claſs II. 1. 2. 11. Does this ſymptom of vomiting indicate, whether the diſeaſe be above or below the valve of the colon? Does not the ſofter pulſe in ſome kinds of enteritis depend on the ſympathy of the heart and arteries with the ſickneſs of the ſtomach? See Ileus and Cholera.

Hence this ſickneſs, as well as the ſickneſs in ſome fevers, cannot be eſteemed an effort of nature to diſlodge any offenſive material; but like the ſea-ſickneſs deſcribed above, and in Sect. XX. 4. is the conſequence of the aſſociations of irritative or ſenſitive motions. See Claſs I. 1. 3. 9.

5. *Vomitio ab inſultu paralytico.* Paralytic affections generally commence with vomiting, the ſame frequently happens from a violent blow with a ſtick on the head; this curious connection of the brain and ſtomach has not been explained; as it reſembles the ſickneſs in conſequence of vertigo at ſea, it would ſeem to ariſe from a ſimilar cauſe, viz. from diſturbed irritative or ſenſitive aſſociations.

6. *Vomitio a titillatione faucium.* If the throat be ſlightly tickled with a feather, a nauſea is produced, that is, an inverted action of the mouths of the lymphatics of the fauces, and by direct ſympathy an inverted action of the ſtomach enſues. As theſe parts have frequently been ſtimulated at the ſame time into pleaſurable action by the deglutition of our daily aliment, their actions become ſtrongly aſſociated. And as all the food, we ſwallow, is either moiſt originally, or mixed with our moiſt ſaliva in the mouth; a feather, which is originally dry, and which in ſome meaſure repels the moiſt ſaliva, is diſagreeable to the

touch of the fauces; at the ſame time this nauſea and vomiting cannot be cauſed by the diſagreeable ſenſation ſimply, as then they ought to have been increaſed exertions, and not decreaſed ones, as ſhewn in Section XXXV. 1. 3. But the mouths of the lymphatics of the fauces are ſtimulated by the dry feather into too great action for a time, and become retrograde afterwards by the debility conſequent to too great previous ſtimulus.

7. *Vomitio cute ſympathetica.* Vomiting is ſucceſsfully ſtopped by the application of a bliſter on the back in ſome fevers, where the extremities are cold, and the ſkin pale. It was ſtopped by Sydenham by producing a ſweat on the ſkin by covering the head with the bed-clothes. See Claſs IV. 1. 1. 3. and Suppl. I. 11. 6.

ORDO III.

Retrograde Aſſociate Motions.

GENUS III.

Catenated with Voluntary Motions.

SPECIES.

1. *Ruminatio.* In the rumination of horned cattle the food is brought up from the firſt ſtomach by the retrograde motions of the ſtomach and œſophagus, which are catenated with the voluntary motions of the abdominal muſcles.

2. *Vomitio voluntaria.* Voluntary vomiting. Some human ſubjects have been ſaid to have obtained this power of voluntary action over the retrograde motions of the ſtomach and œſophagus, and thus to have been able to empty their ſtomach at pleaſure. See Sect. XXV. 6. This voluntary act of emptying the ſtomach is poſſeſſed by ſome birds, as the pigeon; who has an organ for ſecreting milk in its ſtomach, as Mr. Hunter obſerved; and ſoftens the food for its young by previouſly ſwallowing it; and afterwards putting its bill into theirs returns it into their mouths. See Sect. XXXIX. 4. 8. The pelicans uſe a ſtomach, or throat bag, for the purpoſe of bringing the fiſh, which they catch in the ſea to ſhore, and then eject them, and eat them at their leiſure. See Sect. XVI. 11. And I am well informed of a bitch, who having puppies in a ſtable at a diſtance from the houſe, ſwallowed

the fleſh-meat, which was given her, in large pieces, and carrying it immediately to her whelps, brought it up out of her ſtomach, and laid it down before them.

3. *Eructatio voluntaria.* Voluntary eructation. Some, who have weak digeſtions, and thence have frequently been induced to eruct the quantity of air diſcharged from the fermenting aliment in their ſtomachs, have gradually obtained a power of voluntary eructation, and have been able thus to bring up hogſheads of air from their ſtomachs, whenever they pleaſed. This great quantity of air is to be aſcribed to the increaſe of the fermentation of the aliment by drawing off the gas as ſoon as it is produced. See Sect. XXIII. 4.

ORDO III.

Retrograde Aſſociate Motions.

GENUS IV.

Catenated with External Influences.

SPECIES.

1. *Catarrhus periodicus.* Periodical catarrh is not a very uncommon diſeaſe; there is a great diſcharge of a thin ſaline mucous material from the membranes of the noſtrils, and probably from the maxillary and frontal ſinuſes, which recur once a day at exact ſolar periods; unleſs it be diſturbed by the exhibition of opium; and reſembles the periodic cough mentioned below. See Claſs I, 3. 2. 1. It is probably owing to the retrograde action of the lymphatics of the membranes affected, and produced immediately by ſolar influence.

2. *Tuſſis periodica.* Periodic cough, called nervous cough, and tuſſis ferina. It ſeems to ariſe from a periodic retrograde action of the lymphatics of the membrane, which lines the air-cells of the lungs. And the action of coughing, which is violent for an hour or longer, is probably excited by the ſtimulus of the thin fluid thus produced, as well as by the diſagreeable ſenſation attending membranous inactivity; and reſembles periodic catarrh not only in its ſituation on a mucous membrane, but in the diſcharge of a thin fluid. As it is partly reſtrainable, it does not come

under the name of convulſion; and as it is not attended with difficult reſpiration, it cannot be called aſthma; it is cured by very large doſes of opium, ſee a caſe and cure in Sect. XXXVI. 3. 9. ſee Claſs IV. 2. 4. 6. and ſeems immediately to be induced by ſolar influence.

3. *Hyſteria a frigore.* Hyſteric paroxyſms are occaſioned by whatever ſuddenly debilitates the ſyſtem, as fear, or cold, and perhaps ſometimes by external moiſture of the air, as all delicate people have their days of greater or leſs debility, ſee Claſs IV. 3. 1. 8.

4. *Nauſea pluvialis.* Sickneſs at the commencement of a rainy ſeaſon is very common among dogs, who aſſiſt themſelves by eating the agroſtris canina, or dog's graſs, and thus empty their ſtomachs. The ſame occurs with leſs frequency to cats, who make uſe of the ſame expedient. See Sect. XVI. 11. I have known one perſon, who from his early years has always been ſick at the beginning of wet weather, and ſtill continues ſo. Is this owing to a ſympathy of the mucous membrane of the ſtomach with the mechanical relaxation of the external cuticle by a moiſter atmoſphere, as is ſeen in the corrugated cuticle of the hands of waſhing-women? or does it ſympathize with the mucous membrane of the lungs, which muſt be affected along with the mucus on its ſurface by the reſpiration of a moiſter atmoſphere?

SUPPLEMENT

TO

CLASS IV.

SYMPATHETIC THEORY OF FEVER.

AS fever conſiſts in the increaſe or diminution of direct or reverſe aſſociated motions, whatever may have been the remote cauſe of them, it properly belongs to the fourth claſs of diſeaſes; and is introduced at the end of the claſs, that its great difficulties might receive elucidation from the preceding parts of it. Theſe I ſhall endeavour to enumerate under the following heads, truſting that the candid reader will diſcover in theſe rudiments of the theory of fever a naſcent embryon, an infant Hercules, which Time may rear to maturity, and render ſerviceable to mankind.

I. Simple fever of two kinds.
II. Compound fever.
III. Termination of the cold fit.
IV. Return of the cold fit.
V. Senſation excited in fever.
VI. Circles of aſſociated motions.
VII. Alternations of cold and hot fits.

VIII. Orgaſm

VIII. Orgaſm of the capillaries.
IX. Torpor of the lungs.
X. Torpor of the brain.
XI. Torpor of the heart and arteries.
XII. Torpor of the ſtomach and inteſtines.
XIII. Caſe of continued fever explained.
XIV. Termination of continued fever.
XV. Inflammation excited in fever.
XVI. Recapitulation.

I. *Simple Fever.*

1. When a ſmall part of the cutaneous capillaries with their mucous or perſpirative glands are for a ſhort time expoſed to a colder medium, as when the hands are immerſed in iced water for a minute, theſe capillary veſſels and their glands become torpid or quieſcent, owing to the eduction of the ſtimulus of heat. The ſkin then becomes pale, becauſe no blood paſſes through the external capillaries; and appears ſhrunk, becauſe their ſides are collapſed from inactivity, not contracted by ſpaſm; the roots of the hair are left prominent from the ſeceding or ſubſiding of the ſkin around them; and the pain of coldneſs is produced.

In this ſituation, if the uſual degree of warmth be applied, theſe veſſels regain their activity; and having now become more irritable from an accumulation of the ſenſorial power of irritation during their quieſcence, a greater exertion of them follows, with an increaſed glow of the ſkin, and another kind of pain, which is called the hot-ach; but no fever, properly ſo called, is yet produced; as this effect is not univerſal, nor permanent, nor recurrent.

2. If a greater part of the cutaneous capillaries with their mucous and perſpirative glands be expoſed for a longer time to cold, the torpor or quieſcence becomes extended by direct ſympathy to the heart and arteries; which is known by the weakneſs, and conſequent frequency of the pulſe in cold fits of fever.

This requires to be further explained. The movements of the heart and arteries, and the whole of the circulatory veſſels, are in general excited into action by the two ſenſorial powers of irritation, and of aſſociation. The former is excited by ſtimulus, the latter by the previous actions of a part of the vital circle of motions. In the above ſituation the capillaries act weakly from defect of irritation, which is cauſed by deficient ſtimulus of heat; but the heart and arteries act weakly from defect of aſſociation, which is owing to the weak action of the capillaries; which does not now excite the ſenſorial power of aſſociation into action with ſufficient energy.

After a time, either by the application of warmth, or by the increaſe of their irritability owing to the accumulation of the ſenſorial power of irritation during their previous quieſcence, the capillary veſſels and glands act with greater energy than natural; whence the red colour and heat of the ſkin. The heart and arteries acquire a greater ſtrength of pulſation, and continue the frequency of it, owing to the accumulation of the ſenſorial power of aſſociation during their previous torpor, and their conſequent greater aſſociability; which is now alſo more ſtrongly excited by the increaſed actions of the capillaries. And thus a fit of ſimple fever is produced, which is termed Febris irritativa; and conſiſts of a torpor of the cutaneous capillaries with their mucous and perſpirative glands, accompanied with a torpor of the heart and arteries; and afterwards of an increaſed action of all theſe veſſels, by what is termed direct ſympathy.

This fever, with ſtrong pulſe without inflammation, or febris irritativa, deſcribed in Claſs I. 1. 1. 1. is frequently ſeen in vernal intermittents, as the orgaſm of the heart and arteries is then occaſioned by their previous ſtate of torpor; but more rarely I believe exiſts in the type of continued fever, except there be an evident remiſſion, or approximation to a cold fit; at which time a new accumulation of the ſenſorial power of aſſociation is produced; which afterwards actuates the heart and arteries with unnatural vigour; or unleſs there be ſome ſtimulus perpetually acting on the ſyſtem, ſo as to induce an increaſed ſecretion of ſenſorial power in the brain, as occurs in ſlight degrees of intoxication. Since without one or other of theſe circumſtances in continued fevers without inflammation, that is, without the additional ſenſorial power of ſenſation being introduced, it ſeems difficult to account for the production of ſo great a quantity of ſenſorial power, as muſt be neceſſary to give perpetual increaſe of action to the whole ſanguiferous ſyſtem.

3. On the contrary, while the cutaneous capillaries with their mucous and perſpirative glands acquire an increaſed irritability, as above, by the accumulation of that ſenſorial power during their previous quieſcence, and thus conſtitute the hot fit of fever; if the heart and arteries do not acquire any increaſe of aſſociability, but continue in their ſtate of torpor, another kind of ſimple fever is produced; which is generally of the continued kind, and is termed Febris inirritativa; which conſiſts of a previous torpor of the capillaries of the ſkin, and of the heart and arteries by direct ſympathy with them; and afterwards of an orgaſm or increaſed action of the capillaries of the ſkin, with a decreaſed action, or continued torpor, of the heart and arteries by reverſe ſympathy with them. This orgaſm of the cutaneous capillaries, which appears by the bluſh and heat of the ſkin, is at firſt owing to the accumulation of the ſenſorial power of irritation during their previous torpid ſtate, as in the febris irritata above deſcribed; but which is afterwards ſupported or continued by the reverſe ſympathy of theſe capillaries with the torpid ſtate of the heart and arteries, as will be further explained in article 8 of this Supplement.

4. The renovated activity of the capillaries commences as ſoon or ſooner than that of the heart and arteries after the cold fit of irritative fever; and is not owing to their being forced open by the blood being impelled into them mechanically, by the renovated action of the heart and arteries; for theſe capillaries of the ſkin have greater mobility than the heart and arteries, as appears in the ſudden bluſh of ſhame; which may be owing to their being more liable to perpetual varieties of activity from their expoſure to the viciſſitudes of atmoſpheric heat. And becauſe in inirritative fevers, or thoſe with arterial debility, the capillaries acquire increaſed ſtrength, as is evinced by the heat of the ſkin, while the pulſations of the heart and arteries remain feeble.

5. It was ſaid above, that the cutaneous capillaries, when they were rendered torpid by expoſure to cold, either recovered their activity by the reapplication of external warmth; or by their increaſed irritability, which is cauſed by the accumulation of that ſenſorial power during their quieſcence. An example of the former of theſe may be ſeen on emerging from a very cold bath; which produces a fit of ſimple fever; the cold fit, and conſequent hot fit, of which may be prolonged by continuing in the bath; which has indeed proved fatal to ſome weak and delicate people, and to others after having been much exhauſted by heat and exerciſe. See Sect. XXXII. 3. 2. An example of the latter may be taken from going into a

bath of about eighty degrees of heat, as into the bath at Buxton, where the bather firſt feels a chill, and after a minute becomes warm, though he remains in the ſame medium, owing to the increaſe of irritability from the accumulation of that ſenſorial power during the ſhort time, which the chillneſs continued.

6. Hence ſimple fevers are of two kinds; firſt, the febris irritativa, or fever with ſtrong pulſe; which conſiſts of a previous torpor of the heart, arteries, and capillaries, and a ſucceeding orgaſm of thoſe veſſels. Secondly, the febris inirritativa, or fever with weak pulſe, which conſiſts of a previous torpor of the heart, arteries, and capillaries; and of a ſucceeding orgaſm of the capillaries, the torpor of the heart and arteries continuing. But as the frequency of the pulſe occurs both in the ſtate of torpor, and in that of orgaſm, of the heart and arteries; this conſtitutes a criterion to diſtinguiſh fever from other diſeaſes, which are owing to the torpor of ſome parts of the ſyſtem, as pareſis, and hemicrania.

7. The reader will pleaſe to obſerve, that where the cutaneous or pulmonary capillaries are mentioned, their mucous and perſpirative glands are to be underſtood as included; but that the abſorbents belonging to thoſe ſyſtems of veſſels, and the commencement of the veins, are not always included; as theſe are liable to torpor ſeparately, as in anaſarca, and petechiæ; or

to orgaſm, or increaſed action, as in the exhibition of ſtrong emetics, or in the application of vinegar to the lips; yet he will alſo pleaſe to obſerve, that an increaſed or decreaſed action of theſe abſorbents and veins generally occurs along with that of the capillaries, as appears by the dry ſkin in hot fits of fever; and from there being generally at the ſame time no accumulation of venous blood in the cutaneous veſſels, which would appear by its purple colour.

II. *Compound Fever.*

1. When other parts of the ſyſtem ſympathize with this torpor and orgaſm of the cutaneous capillaries, and of the heart and arteries; the fever-fit becomes more complicated and dangerous; and this in proportion to the number and conſequence of ſuch affected parts. Thus if the lungs become affected, as in going into very cold water, a ſhortneſs of breath occurs; which is owing to the collapſe or inactivity (not to the active contraction, or ſpaſm), of the pulmonary capillaries; which, as the lungs are not ſenſible to cold, are not ſubject to painful ſenſation, and conſequent ſhuddering, like the ſkin. In this caſe after a time the pulmonary capillaries, like the cutaneous ones, act with increaſed energy; the breathing, which was before quick, and the air thrown out at each reſpiration in leſs quantity, and cool to the back of the hand oppoſed to it, now becomes large in quantity, and warmer than natural; which however is not accompanied with the ſenſation of heat in the mem-

brane, which lines the air-veſſels of the lungs, as in the ſkin.

2. One conſequence of this increaſed heat of the breath is the increaſed evaporation of the mucus on the tongue and noſtrils. A viſcid material is ſecreted by theſe membranes to preſerve them moiſt and ſupple, for the purpoſes of the ſenſes of taſte and of ſmell, which are extended beneath their ſurfaces; this viſcid mucus, when the aqueous part of it is evaporated by the increaſed heat of the reſpired air, or is abſorbed by the too great action of the mucous abſorbents, adheres cloſely on thoſe membranes, and is not without difficulty to be ſeparated from them. This dryneſs of the tongue and noſtrils is a circumſtance therefore worthy to be attended to; as it ſhews the increaſed action of the pulmonary capillaries, and the conſequent increaſed heat of the expired air; and may thus indicate, when colder air ſhould be admitted to the patient. See Claſs I. 1. 3. 1. The middle part of the tongue becomes dry ſooner, and recovers its moiſture later, than the edges of it; becauſe the currents of reſpired air paſs moſt over the middle part of it. This however is not the caſe, when the dryneſs of the tongue is owing only to the increaſed mucous abſorption. When however a frequent cough attends pulmonary inflammation, the edges of the tongue are liable to be as much furred as the middle of it; as during the action of coughing the middle of the tongue is depreſſed, ſo as to form half a cylinder, to give a greater aperture for the emiſſion of air from the

larynx;

larynx; and the edges of it become thus as much expoſed to the currents of air, as the middle parts of it.

3. When the internal capillaries or glands ſympathize with the cutaneous capillaries; or when any of them are previouſly affected with torpor, and the external or cutaneous capillaries are affected ſecondarily; other ſymptoms are produced, which render the paroxyſms of fever ſtill more complicate. Thus if the ſpleen or pancreas are primarily or ſecondarily affected, ſo as to be rendered torpid or quieſcent, they are liable to become enlarged, and to remain ſo even after the extinction of the fever-fit. Theſe in ſome intermittent fevers are perceptible to the hand, and are called ague-cakes; their tumour ſeems to be owing to the permanent torpor of the abſorbent ſyſtem, the ſecerning veſſels continuing to act ſome time afterwards. If the ſecretory veſſels of the liver are affected firſt with torpor, and afterwards with orgaſm, a greater ſecretion of bile is produced, which ſometimes cauſes a diarrhœa. If a torpor of the kidneys, and of the abſorbents of the bladder occurs, either primarily, or by ſympathy with the cutaneous capillaries, the urine is in ſmall quantity and pale, as explained in Claſs I. 2. 2. 5.; and if theſe ſecretory veſſels of the kidneys, and the abſorbents of the bladder act more ſtrongly than natural afterwards by their increaſed irritability or aſſociability, the urine becomes in larger quantity, and deeper coloured, or depoſits its earthy

parts, as in Claſs I. 1. 2. 4. which has been eſteemed a favourable circumſtance. But if the urine be in ſmall quantity, and no ſediment appears in it, after the hot fit is over; it ſhews, that the ſecerning veſſels of the kidneys and the abſorbent veſſels of the bladder have not regained the whole of their activity, and thence indicates a greater tendency to a return of the cold fit.

4. When the ſtomach is affected with torpor either primarily; or ſecondarily by its ſympathy with the cutaneous capillaries; or with ſome internal viſcus; ſickneſs occurs, with a total want of appetite to any thing ſolid; vomiting then ſupervenes, which may often be relieved by a bliſter on the ſkin, if the ſkin be cool and pale; but not if it be hot and fluſhed. The inteſtines ceaſe to perform their office of abſorption from a ſimilar torpor; and a diarrhœa ſupervenes owing to the acrimony of their putrid, or of their acid contents. The looſe undigeſted or fetid ſtools indicate the inability of the inteſtines to perform their proper office; as the mucus and gaſtric acid, which are vomited up, does that of the ſtomach; this torpor of the ſtomach is liable to continue after the cold paroxyſm ceaſes, and to convert intermittent fevers into continued ones by its direct ſympathy with the heart and arteries. See article 10 of this Supplement.

5. If the meninges of the brain ſympathize with other torpid parts, or are primarily affected, delirium, ſtupor, and perhaps hydrocephalus internus occur, ſee Claſs II. 1. 7. 1. and I. 2. 5. 10; and ſometimes the pulſe becomes ſlow, producing pareſis inſtead of fever. But if the membranes, which cover the muſcles about the head, or of the pericranium, become torpid by their ſympathy with other torpid parts, or are primarily affected, a head-ach ſupervenes; which however generally ceaſes with the cold paroxyſm of fever. For as when the ſenſorial power of volition is exhauſted by labour, a few hours, or half a ſolar day, paſſed in ſleep recruits the ſyſtem by accumulation of this ſenſorial power; ſo when the ſenſorial power of irritation is exhauſted, one or two ſolar or lunar days of reſt or quieſcence of the affected part will generally reſtore its action by accumulation of irritability, and conſequent increaſe of aſſociation, as in hemicrania, Claſs IV. 2. 2. 8. But when the heart and arteries become torpid, either primarily, or by their ſympathy with the ſtomach, this accumulation of the ſenſorial power of irritation can take place but ſlowly; *as to reſt is death!* This explains the cauſe of the duration of fevers with weak pulſe, which continue a quarter, or half, or three quarters, or a whole lunation, or ſtill longer, before ſufficient accumulation of irritability can be produced to reſtore their natural ſtrength of action.

6. If the abſorbent veſſels, which are ſpread around the neck of the bladder, become torpid by their direct ſympathy with the abſorbents of the ſkin in cold fits of fever; the urine, which is poured into the bladder in but ſmall quantity from the torpid kidneys, has nevertheleſs none of its aqueous ſaline part reabſorbed; and this ſaline part ſtimulates the bladder to empty itſelf frequently, though the urine is in ſmall quantity. Which is not therefore owing to any ſuppoſed ſpaſm of the bladder, for the action of it in excluding the urine is weak, and as much controlable by the will as in ordinary micturition.

7. If the beginnings or abſorbent mouths of the venous ſyſtem remain torpid, petechiæ or vibices are produced in fevers, ſimilar to thoſe which are ſeen in ſcurvy without fever. If the ſkin was frequently moiſtened for an hour, and at the ſame time expoſed to the common air, or to oxygen gas, it might contribute to turn the black colour of theſe points of extravaſated blood into ſcarlet, and thus by increaſing its ſtimulus facilitate its reabſorption? For oxygen gas penetrates moiſt animal membranes though not dry ones, as in the lungs during reſpiration.

8. When the ſenſorial power of ſenſation is introduced into the arterial ſyſtem, other kinds of compound fevers are produced, which will be ſpoken of in their place.

III. *Termination of the cold Fit.*

1. If all the parts, which were affected with torpor, regain their irritability, and aſſociability, the cold paroxyſm of fever ceaſes; but as ſome of the parts affected were previouſly accuſtomed to inceſſant action, as the heart and arteries, and others only to intermitted action, as the ſtomach and inteſtines; and as thoſe, which are ſubjected during health to perpetual action, accumulate ſenſorial power faſter, when their motions are impeded, than thoſe which are ſubjected to intermitted action; it happens, that ſome of the parts, which were affected with torpor during the cold fit, recover their irritability or aſſociability ſooner than others, and more perfectly, or acquire a greater quantity of them than natural; as appears by the partial heat and fluſhings previous to the general hot fit.

Hence if all the parts, which were previouſly torpid, regain their due degree of irritability, or of aſſociability, the diſeaſe is removed, and health reſtored. If ſome or all of them acquire more than their natural degree of theſe ſenſorial powers; increaſed actions, and conſequent increaſed ſecretions, and greater heat occur, and conſtitute the hot fit of fever. If after this hot fit of fever all the parts, which had acquired too great irritability, or aſſociability, regain their natural degree of it; the diſeaſe is removed, and health reſtored. But if ſome of theſe parts do not regain their natural degree of theſe ſenſorial powers, the actions of thoſe parts remain imperfect, and are more or leſs injurious to the ſyſtem, according to the importance of their functions.

2. Thus if a torpor of the heart and arteries remains; the quick pulſe without ſtrength, which begins in the cold fit, perſiſts; and a continued fever is produced. If the torpor of the ſtomach and inteſtines remains, which are known by ſickneſs and undigeſted ſtools, the fever is liable to be of conſiderable length and danger; the ſame if the kidneys and abſorbent ſyſtem retain ſome degree of torpor, as is ſhewn by the pale urine in not unuſual quantity. If part of the abſorbent ſyſtem remains torpid, as the abſorbent veſſels of the ſpleen, a tumour of that viſcus occurs, which may be felt by the hand; the ſame ſometimes happens to the liver; and theſe from their tendency to more complete torpor are afterwards liable to give occaſion to a return of the cold fit. If the cellular abſorbents do not completely recover their activity, a pale and bloated countenance with ſwelled legs mark their want of action.

3. As the termination of the cold fit is owing to the accumulation of the ſenſorial power of irritation and of aſſociation during the previous quieſcence of the ſyſtem; and as thoſe parts, which are in perpetual action during health, are more ſubject to this accumulation during their torpor, or quieſcence; one ſhould have imagined, that the heart and arteries would ac-

quire this accumulation of ſenſorial power ſooner or in greater degree than other parts. This indeed ſo happens, where the pulſe is previouſly ſtrong, as in febris irritativa; or where another ſenſorial power, as that of ſenſation, is exerted on the arterial ſyſtem, as in inflammations. The heart and arteries in theſe caſes ſoon recover from their torpor, and are exerted with great violence.

Many other parts of the ſyſtem ſubject to perpetual motion in health may reſt for a time without much inconvenience to the whole; as when the fingers of ſome people become cold and pale; and during this complete reſt great accumulation of irritability may be produced. But where the heart and arteries are previouſly feeble, they cannot much diminiſh their actions, and certainly cannot reſt entirely, for that would be death; and therefore in this caſe their accumulation of the ſenſorial power of irritation or of aſſociation is ſlowly produced, and a long fever ſupervenes in conſequence; or ſudden death, as frequently happens, terminates the cold fit.

Whence it appears, that in fevers with weak pulſe, if the action of the heart, arteries, and capillaries could be diminiſhed, or ſtopped for a ſhort time without occaſioning the death of the patient, as happens in cold bathing, or to perſons apparently drowned, that a great accumulation of the ſenſorial powers of irritation or of aſſociation might ſoon be produced, and the pulſe become ſtronger, and conſequently ſlower, and the fever ceaſe. Hence cold ablution may be of ſervice in fevers with weak pulſe, by preventing the expenditure and producing accumulation of the ſenſorial power of irritation or aſſociation. Stupor may be uſeful on the ſame account. Could a centrifugal ſwing be ſerviceable for this purpoſe, either by placing the head or the feet in the outward part of the circle, as deſcribed in Art. 15. 7. of this Supplement?

IV. *Return of the cold Fit.*

1. If the increaſed action of the cutaneous and pulmonary capillaries, and of the heart and arteries, in febris irritativa continues long and with violence, a proportional expenditure or exhauſtion of ſenſorial power occurs; which by its tendency to induce torpor of ſome part, or of the whole, brings on a return of the cold fit.

2. Another cauſe which contributes to induce torpor of the whole ſyſtem by the ſympathy of its parts with each other, is the remaining torpor of ſome viſcus; which after the laſt cold paroxyſm had not recovered itſelf, as of the ſpleen, liver, kidneys, or of the ſtomach and inteſtines, or abſorbent veſſels, as above mentioned.

3. Other cauſes are the deficiency of the natural ſtimuli, as hunger, thirſt, and want of freſh air. Other cauſes are great fatigue, want of reſt, fear, grief, or anxiety of mind. And laſtly, the influence

of external ethereal fluids, as the defect of external heat, and of ſolar or lunar gravitation. Of the latter the return of the paroxyſms of the continued fevers about ſix o'clock in the evening, when the ſolar gravitation is the leaſt, affords an example of the influence of it; and the uſual periods of intermittents, whether quotidian, tertian, or quartan, which ſo regularly obey ſolar or lunar days, afford inſtances of the influence of thoſe luminaries on theſe kinds of fevers.

4. If the tendency to torpor of ſome viſcus is conſiderable, this will be increaſed at the time, when the terrene gravitation is greateſt, as explained in the introduction to Claſs IV. 2. 4. and may either produce a cold paroxyſm of quotidian fever; or it may not yet be ſufficient in quantity for that purpoſe, but may nevertheleſs become greater, and continue ſo till the next period of the greateſt terrene gravitation, and may then either produce a paroxyſm of tertian fever; or may ſtill become greater, and continue ſo till the next period of greateſt terrene gravitation, and then produce a paroxyſm of quartan ague. And laſtly, the periodical times of theſe paroxyſms may exceed, or fall ſhort of, the time of greateſt diurnal terrene gravitation according to the time of day, or period of the moon, in which the firſt fit began; that is, whether the diurnal terrene gravitation was then in an increaſing or decreaſing ſtate.

V. *Sen-*

V. *Senſation excited in Fever.*

1. A curious obſervation is related by Dr. Fordyce in his Tract on Simple fever, page 168. He aſſerts, that thoſe people, who have been confined ſome time in a very warm atmoſphere, as of 120 or 130 degrees of heat, do not feel cold, nor are ſubject to paleneſs of their ſkins, on coming into a temperature of 30 or 40 degrees; which would produce great paleneſs and painful ſenſation of coldneſs in thoſe, who had been ſome time confined in an atmoſphere of only 86 or 90 degrees. Analagous to this, an obſerving friend of mine aſſured me, that once having ſat up to a very late hour with three or four very ingenious and humorous companions, and drank a conſiderable quantity of wine; both contrary to his uſual habits of life; and being obliged to riſe early, and to ride a long journey on the next day; he expected to have found himſelf weak and ſoon fatigued; but on the contrary he performed his journey with unuſual eaſe and alacrity; and frequently laughed, as he rode, at the wit of the preceding evening. In both theſe caſes a degree of pain or pleaſure actuated the ſyſtem; and thus a ſenſorial power, that of ſenſation, was ſuperadded to that of irritation, or volition. See Sect. XXXIV. 2. 6.

2. Similar to this, when the energetic exertions of ſome parts of the ſyſtem in the hot fit of fever ariſe to a certain exceſs, a degree of ſenſation is produced;

as of heat, which particularly increaſes the actions of the cutaneous veſſels, which are more liable to be excited by this ſtimulus. When this additional ſenſorial power of ſenſation exiſts to a greater degree, the pulſe, which was before full, now becomes hard, owing to the inflammation of the vaſa vaſorum, or coats of the arteries. In theſe caſes, whether there is any topical inflammation or not, the fever ceaſes to intermit; but nevertheleſs there are daily remiſſions and exacerbations of it; which recur for the moſt part about ſix in the evening, when the ſolar gravitation is the leaſt, as mentioned in Sect. XXXVI. 3. 7.

3. Thus the introduction of another ſenſorial power, that of ſenſation, converts an intermittent fever into a continued one. If it be attended with ſtrong pulſe, it is termed febris ſenſitiva irritata, or pyrexia, or inflammation; if with a weak pulſe, it is termed febris ſenſitiva inirritata, or typhus gravior, or malignant fever. The ſeat of the inflammation is in the glandular or capillary ſyſtem, as it conſiſts in the ſecretion of new fluids, or new fibres, which form new veſſels, as they harden, like the ſilk of the ſilkworm. See Art. 15. of this Supplement.

VI. *Circles of irritative Aſſociate Motions.*

1. There are ſome aſſociate motions, which are perpetually proceeding in our waking hours, and are catenated by their firſt link, or in ſome ſubſequent parts of the chain, with the ſtimuli or the influence

of external things; which we ſhall here enumerate, as they contribute to the knowledge of fever. Of theſe are the irritative ideas, or ſenſual motions of the organs of ſenſe, and the muſcular motions aſſociated with them; which, when the chain is diſturbed or interrupted, excite the ſenſorial power of ſenſation, and proceed in confuſion. Thus if the irritative ideas of ſight are diſturbed, the paralactic motions of objects, which in general are unperceived, become ſenſible to us; and the locomotive muſcles aſſociated with them, which ought to preſerve the body erect, ſtagger from this decreaſe or interruption of the ſenſorial power of aſſociation; and vertigo is produced.

When the irritative ſenſual motions, or ideas, belonging to one ſenſe are increaſed or diminiſhed, the irritative ſenſual motions, or ideas, of the other ſenſes are liable to become diſturbed by their general catenations; whence occur noiſes in the ears, bad taſtes in the mouth, bad odours, and numbneſs or tingling of the limbs, as a greater or leſs number of ſenſes are affected. Theſe conſtitute concomitant circles of diſturbed irritative ideas; or make a part of the great circle of irritative ideas, or motions of the organs of ſenſe; and when thus diſturbed occaſion many kinds of hallucination of our other ſenſes, or attend on the vertigo of viſion.

2. Another great circle of irritative aſſociated motions conſiſts of thoſe of the alimentary canal; which are catenated with ſtimuli or with influences external

to the ſyſtem, but continue to be exerted in our ſleeping as well as in our waking hours. When theſe aſſociations of motion are diſturbed by the too great or too ſmall ſtimulus of the food taken into the ſtomach, or by the too great exceſs or deprivation of heat, or by indigeſtible ſubſtances, or by torpor or orgaſm occaſioned by their aſſociation with other parts, various diſeaſes are induced under the names of apepſia, hypochondriaſis, hyſteria, diarrhœa, cholera, ileus, nephritis, fever.

3. A third circle of irritative aſſociate motions conſiſts of thoſe of the abſorbent ſyſtem; which may be divided into two, the lacteals, and the lymphatics. When the ſtomach and inteſtines are recently filled with food and fluid, the lacteal ſyſtem is ſtimulated into great action; at the ſame time the cellular, cutaneous, and pulmonary lymphatics act with leſs energy; becauſe leſs fluid is then wanted from thoſe branches, and becauſe more ſenſorial power is expended by the lacteal branch. On this account theſe two ſyſtems of abſorbents are liable to act by reverſe ſympathy; hence pale urine is made after a full dinner, as leſs of the aqueous part of it is imbibed by the urinary lymphatics; and hence the water in anaſarca of the lungs and limbs is ſpeedily abſorbed, when the actions of the lacteals of the ſtomach or inteſtines are weakened or inverted by the exhibition of thoſe drugs, which produce nauſea, or by violent vomiting, or violent cathartics.

Hence in diabetes the lacteal ſyſtem acts ſtrongly, at the ſame time that the urinary lymphatics invert their motions, and tranſmit the chyle into the bladder; and in diarrhœa from crapula, or too great a quantity of food and fluid taken at a time, the lacteals act ſtrongly, and abſorb chyle or fluids from the ſtomach and upper inteſtines; while the lymphatics of the lower inteſtines revert their motions, and tranſmit this over-repletion into the lower inteſtines, and thus produce diarrhœa; which accounts for the ſpeedy operation of ſome cathartic drugs, when much fluid is taken along with them.

4. Other circles of irritative aſſociate motions of great importance are thoſe of the ſecerning ſyſtem; of theſe are the motions of the larger congeries of glands, which form the liver, ſpleen, pancreas, gaſtric glands, kidneys, ſalivary glands, and many others; ſome of which act by direct and others by reverſe ſympathy with each other. Thus when the gaſtric glands act moſt powerfully, as when the ſtomach is filled with food, the kidneys act with leſs energy; as is ſhewn by the ſmall ſecretion of urine for the firſt hour or two after dinner; which reverſe ſympathy is occaſioned by the greater expenditure of ſenſorial power on the gaſtric glands, and to the newly abſorbed fluids not yet being ſufficiently animalized, or otherwiſe prepared, to ſtimulate the ſecretory veſſels of the kidneys.

But thoſe very extenſive glands, which ſecrete the perſpirable matter of the ſkin and lungs, with the mucus, which lubricates all the internal cells and cavities of the body, claim our particular attention. Theſe glands, as well as all the others, proceed from the capillary veſſels, which unite the arteries with the veins, and are not properly a part of them; the mucous and perſpirable glands, which ariſe from the cutaneous and pulmonary capillaries, are aſſociated by direct ſympathy; as appears from immerſion in the cold bath, which is therefore attended with a temporary difficult reſpiration; while thoſe from the capillaries of the ſtomach and heart and arteries are more generally aſſociated by reverſe ſympathy with thoſe of the cutaneous capillaries; as appears in fevers with weak pulſe and indigeſtion, and at the ſame time with a hot and dry ſkin.

The diſturbed actions of this circle of the aſſociate motions of the ſecerning ſyſtem, when the ſenſorial power of ſenſation is added to that of irritation, frequently produces inflammation, which conſiſts in the ſecretion of new fluids or new veſſels. Nevertheleſs, if theſe diſturbed actions be of the torpid kind, the pain, which attends them, is ſeldom productive of inflammation, as in hemicrania; but is liable to excite voluntary actions, and thus to expend much ſenſorial power, as in the ſhuddering in cold fits of fever, or in convulſions; or laſtly, the pain itſelf, which attends torpid actions, is liable to expend or exhauſt much ſenſorial power without producing any increaſed actions; whence the low pulſe, and cold extremities, which uſually attend hemicrania; and hence when inert, or inactive ſenſation attends one link of aſſociated action, the ſucceeding link is generally rendered torpid, as a coldneſs of the cheek attends tooth-ach.

5. A fifth important circle of irritative motions is that of the ſanguiferous ſyſtem, in which the capillary veſſels are to be included, which unite the arterial and venous ſyſtems, both pulmonary and aortal. The diſturbed action of this ſyſtem of the heart and arteries, and capillaries, conſtitute ſimple fever; to which may be added, that the ſecerning and abſorbent veſſels appending to the capillaries, and the bibulous mouths of the veins, are in ſome meaſure at the ſame time generally affected.

6. Now, though the links of each of theſe circles of irritative motions are more ſtrictly aſſociated together, yet are they in greater or leſs degree aſſociated or catenated with each other by direct or reverſe ſympathy. Thus the ſickneſs, or inverted irritative motions of the ſtomach, are aſſociated or catenated with the diſturbed irritative ideas, or ſenſual motions, in vertigo; as in ſea-ſickneſs. This ſickneſs of the ſtomach is alſo aſſociated or catenated with the torpor of the heart and arteries by direct ſympathy, and with the capillaries and abſorbents by reverſe ſympathy; and are thus all of them liable occaſionally to be diſturbed, when one of them is diſeaſed; and conſtitute the great variety of the kinds or ſymptoms of fevers.

VII. *Alternation of the cold and hot Fits.*

1. When any cauſe occurs, which diminiſhes to a certain degree the ſupply of ſenſorial power in reſpect to the whole ſyſtem; as ſuppoſe a temporary inexertion of the brain; what happens? Firſt, thoſe motions are exerted with leſs energy, which are not immediately neceſſary to life, as the locomotive muſcles; and thoſe ideas, which are generally excited by volition; at the ſame time this deficiency of voluntary motion is different from that which occurs in ſleep; as in that the movements of the arterial ſyſtem are increaſed in energy though not in frequency. Next, the motions of the alimentary canal become performed with leſs energy, or ceaſe altogether; and a total want of appetit to ſolid food occurs, or ſickneſs, or a diarrhœa occaſioned by the indigeſted aliment. Then the abſorbent veſſels ceaſe to act with their due energy; whence thirſt, and pale urine, though in ſmall quantities. Fourthly, the ſecerning veſſels become affected by the general diminution of ſenſorial power; whence all the ſecreted fluids are produced in leſs quantity. And laſtly, the ſanguiferous canals feel the general torpor; the pulſations of the heart and arteries become feeble, and conſequently quick; and the capillaries of the ſkin become inactive, acquire leſs blood from the arteries, and are conſequently paler and ſhrunk.

In this laſt circumſtance of the torpor of the ſanguiferous ſyſtem conſiſts inirritative fever; as all the others are rather accidental or concomitant ſymptoms, and not eſſential ones; as fewer or more of them may be preſent, or may exiſt with a greater or leſs degree of inactivity.

2. Now as the capillaries of the ſkin are expoſed to greater varieties of heat and cold, than the heart and arteries, they are ſuppoſed to be more mobile, that is, more ſuſceptible of torpor or exertion, or of inflammation, by external ſtimuli or influences, than the other parts of the ſanguiferous ſyſtem; and as the ſkin is more ſenſible to the preſence of heat, than the internal parts of the body, the commencement of the cold paroxyſms of fever generally either firſt exiſts in, or is firſt perceived by, the coldneſs and paleneſs of the ſkin; and the commencement of the hot fits by the heat and redneſs of it.

3. The accumulation of ſenſorial power occurs in theſe organs ſooneſt, and in greateſt quantity, during their quieſcence, which were moſt perpetually in action during health; hence thoſe parts of the ſyſtem ſooneſt recover from torpor in intermittent fever, and ſooneſt fall into the contrary extreme of increaſed activity; as the ſanguiferous ſyſtem of the heart and arteries and capillaries. But of theſe the capillaries ſeem firſt to acquire a renovation of their action, as the heat of the ſkin becomes firſt renewed, as well as increaſed beyond its natural quantity, and this in ſome parts ſooner than in others; which quantity of heat is however not to be eſtimated ſimply by the

riſe of the mercury in the thermometer, but alſo by the quantity carried away into the atmoſphere, or diffuſed amongſt other bodies in a given time; as more heat paſſes through water, which boils vehemently, than when it boils gently, though the riſe of the thermometer in both caſes continues the ſame. This fact may be known by boiling an egg in water, the white of which coagulates in much leſs time, if the water boils vehemently, than if it boils moderately, though the ſenſible heat of the water is the ſame in both caſes.

Another cauſe, which induces the cutaneous capillaries to renew their actions ſooner than the heart and arteries after immerſion in the cold bath, is, that their torpor was occaſioned by defect of irritation; whereas that of the heart and arteries was occaſioned by defect of aſſociation; which defect of aſſociation was owing to the decreaſed actions of the capillaries, and is now again excited by their renewed action; which excitement muſt therefore be ſubſequent to that increaſed action of the capillaries; and in conſequence the increaſed action of the heart and arteries at the commencement of the hot fit of ſome fevers is ſubſequent to the increaſed action of the cutaneous capillaries. There is, however, in this caſe an accumulation of the ſenſorial power of aſſociation in the heart and arteries, which muſt contribute to increaſe their orgaſm in the hot fit, as well as the increaſed excitement of it by the increaſed action of the capillaries.

4. Now this increaſed action of the ſyſtem, during the hot fit, by exhauſting the ſenſorial powers of irritation and aſſociation, contributes to induce a renewal of the cold paroxyſm; as the accumulation of thoſe ſenſorial powers in the cold fit produces the increaſed actions of the hot fit; which two ſtates of the ſyſtem reciprocally induce each other by a kind of libration, or a plus and minus, of the ſenſorial powers of irritation and aſſociation.

If the exhauſtion of ſenſorial power during the hot fit of fever only reduces the quantity of irritability and aſſociability to its natural ſtandard, the fever is cured, not being liable to return. If the quantity of theſe ſenſorial powers be reduced only ſo much, as not to produce a ſecond cold fit during the preſent quantity of external ſtimuli or influences; yet it may be ſo far reduced, that a very ſmall ſubtraction of ſtimulus, or of influence, may again induce a cold fit; ſuch as the coldneſs of the night-air, or the diminution of ſolar or lunar gravitation, as in intermittent fevers.

5. Another cauſe of the renovation of the cold fits of fever is from ſome parts of the ſyſtem not having completely recovered from the former cold paroxyſm; as happens to the ſpleen, liver, or other internal viſcus; which ſometimes remains tumid, and either occaſions a return of the cold fit by direct ſympathy with other parts of the body, or by its own want of action cauſes a diminution of the general quantity of heat, and thus facilitates the renovation of the torpor of the

whole ſyſtem, and gives cauſe to intermittent fevers catenated with lunar or ſolar influence.

VIII. *Orgaſm of the Capillaries.*

As the remaining torpor of ſome leſs eſſential part of the ſyſtem, as of the ſpleen, when the hot fit ceaſes, produces after one, two, or three days a return of cold fit by direct ſympathy with the cutaneous capillaries, when joined with ſome other cauſe of torpor, as the defect of ſolar or lunar influences, or the expoſure to cold or hunger, and thus gives origin to intermittent fever; ſo the remaining torpor of ſome more eſſential parts of the ſyſtem, as of the ſtomach and inteſtines, is probably the cauſe of the immediate recurrence of the cold paroxyſm, at the time the hot one ceaſes, by their direct ſympathy with the cutaneous capillaries, without the aſſiſtance of any other cauſe of torpor; and thus produces remittent fever. And laſtly the remaining torpor of ſome ſtill more eſſential parts of the ſyſtem, as the heart and arteries, after the hot fit ought to ceaſe, is liable by reverſe ſympathy with the cutaneous capillaries to continue their orgaſm, and thus to render a fever continual, which would otherwiſe remit or intermit.

Many difficulties here occur, which we ſhall endeavour to throw ſome light upon, and leave to future inveſtigation; obſerving only that difficulties were to be expected, otherwiſe fevers would long ſince have been underſtood, as they have employed the unremitted attention of the phyſicians of all ages of the world.

1. Why do the ſame parts of ſucceſſive trains of action ſometimes affect each other by direct, and ſometimes by reverſe ſympathy?—1ſt, When any irritative motion ceaſes, or becomes torpid, which was before in perpetual action; it is either deprived of its uſual ſtimulus, and thence the ſenſorial power of irritation is not excited; or it has been previouſly too much ſtimulated, and the ſenſorial power has been thus exhauſted.

In the former caſe an accumulation of ſenſorial power ſoon occurs, which is excitable by a renewal of the ſtimulus; as when the fingers, which have been immerſed ſome time in ſnow, are again expoſed to the uſual warmth of a room. Or, ſecondly, the ſenſorial power of irritation becomes ſo much accumulated, that the motions, which were torpid, are now performed by leſs ſtimulus than natural; as appears by the warmth, which ſoon occurs after the firſt chill in going into froſty air, or into the bath at Buxton, which is about eighty degrees of heat. Or, laſtly, this accumulation of the ſenſorial power of irritation ſo far abounds, that it increaſes the action of the next link of the aſſociated train or tribe of motions; thus on expoſing the ſkin to cold air, as in walking out in a froſty morning, the actions of the ſtomach are increaſed, and digeſtion ſtrengthened.

But where the torpor of ſome irritative motion is owing to the previous exhauſtion of the ſenſorial power of irritation by too great ſtimulus, the reſtoration of it occurs either not at all, or much more ſlowly than in the former inſtances; thus after intoxication the ſtomach is very ſlow in recovering its due quantity of the ſenſorial power of irritation, and never ſhews any accumulation of it.

2. When an aſſociate motion, as deſcribed in the introduction to Claſs IV. 1. 1. acts with leſs energy, the ſenſorial power of aſſociation is either not ſufficiently excited by the preceding fibrous motions; or it has been expended or exhauſted by the too violent actions of the preceding fibrous motions. In the former caſe there occurs an accumulation of the ſenſorial power of aſſociation; exactly as, where the uſual ſtimulus is withdrawn, there occurs an accumulation of the ſenſorial power of irritation. Thus when the actions of the capillaries of the ſkin are diminiſhed by immerſion in cold water, the capillaries of the lungs are rendered torpid by the want of the excitement of the ſenſorial power of aſſociation, owing to the leſſened actions of the previous fibrous motions, namely, of thoſe of the ſkin. Nevertheleſs as ſoon as the capillaries of the ſkin regain their increaſed activity by the accumulation of the ſenſorial power of irritation, theſe capillaries of the lungs act with greater energy alſo owing to their accumulated ſenſorial power of aſſociation. Theſe are inſtances of direct ſympathy, and conſtitute the cold and hot paroxyſms of intermittent fever; or the firſt paroxyſm of a continued one.

3. When the firſt link of a train of aſſociated motions, which is ſubject to perpetual action, becomes a conſiderable time torpid for want of being excited by the previous exertions of the irritative motions, with which it is catenated; the ſenſorial power of aſſociation becomes accumulated in ſo great a degree as to affect the ſecond link of the train of aſſociated motions, and to excite it into ſtronger action. Thus when the ſtomach is rendered torpid by contagious matter ſwallowed into it mixed with the ſaliva, the heart and arteries act more feebly; becauſe the ſenſorial power of aſſociation, which uſed to be excited by the fibrous motions of the ſtomach, is not now excited; and in conſequence the motions of the heart and arteries act only by the ſenſorial power of irritation, which is excited by the ſtimulus of the blood.

But during this torpor of the ſtomach, and leſs action of the heart and arteries, ſo great an accumulation of the ſenſorial powers of irritation and of aſſociation occurs, that it adds to the action of the next link of this vital circle of actions, that is, to that of the cutaneous capillaries. Whence in this ſituation the torpor of the ſtomach occaſions a diminiſhed action of the heart and arteries by direct ſympathy, and may be ſaid to occaſion an increaſed one of the cutaneous capillaries by reverſe ſympathy; which conſtitute continued fever with weak pulſe.

Nor is this increaſed action of the capillaries in conſequence of the decreaſed action of the heart and arteries, as in fevers with weak pulſe, a ſingle fact in the animal economy; though it exiſts in this caſe in the greateſt degree or duration, becauſe the heart and arteries are perpetually in greater action than any other part of the ſyſtem. But a ſimilar circumſtance occurs, when the ſtomach is rendered inactive by defective excitement of the ſenſorial power of aſſociation, as in ſea-ſickneſs, or in nephritis. In theſe caſes the ſenſorial power of aſſociation becomes much accumulated in the ſtomach, and ſeems by its ſuperabundance to excite the abſorbent ſyſtem, which is ſo nearly connected with it, into great increaſe of action; as is known by the great quantity frequently in theſe ſituations rejected by vomit, which could not otherways be ſupplied. It is probable the increaſe of digeſtion by walking in froſty air, with many other animal facts, may by future obſervations be found to be dependent on this principle, as well as the increaſed action of the capillaries in continued fevers with weak pulſe.

Whereas in continued fever with ſtrong pulſe, which may perhaps occur ſometimes on the firſt day even of the plague, the ſtomach with the heart and arteries and the capillaries act by direct ſympathy; that is, the ſtomach is excited into ſtronger action by increaſed irritation owing to the ſtimulus of contagious matter; theſe ſtronger irritative motions of the ſtomach excite a greater quantity of the ſenſorial power of aſſociation, which then actuates the heart and arteries with greater energy, as theſe are catenated with the ſtomach; and in the ſame manner the increaſed actions of the heart and arteries excite a greater quantity of the ſenſorial power of aſſociation which actuates the cutaneous capillaries with increaſe of energy. See Claſs IV. 1. 1.

4. I ſhall dwell a little longer on this intricate ſubject. The commencement of fever-fits is known by the inactivity of the cutaneous capillaries, which inactivity is obſervable by the paleneſs and coldneſs of the ſkin, and alſo by the pain of coldneſs, which attends it. There is nevertheleſs in moſt caſes, except thoſe which are owing to expoſure to external cold, a torpor of the capillaries of ſome internal viſcus preceding this inactivity of the cutaneous capillaries; which is known by the tumor or hardneſs of the viſcus, or by an aching pain of it. The capillaries of the lungs are at the ſame time rendered inactive or torpid, as appears by the difficulty of breathing, and coldneſs of the breath in cold fits of fever, and in going into the cold bath; but the lungs are not affected with the pain either of coldneſs or of torpor. One cauſe of this ſynchronous or ſucceſſive inactivity of the cutaneous capillaries, in conſequence of the previous torpor of ſome internal viſcus, may be owing to the deficiency of heat; which muſt occur, when any part becomes inactive; becauſe the ſecretions of that part ceaſe or are leſſened, and the quantity of heat of it in conſequence. But the principal cauſe of it I ſuppoſe to be owing to the defect of the ſenſorial power of aſſociation; which power of aſſo-

ciation is excited by ſome previous or concomitant motions of the parts of every great circle of actions. This appears on going into the cold bath, becauſe the ſhortneſs of breath inſtantly occurs, ſooner than one can conceive the diminution of the heat of the ſkin could affect the lungs by the want of its ſtimulus; but not ſooner than the defect of the ſenſorial power of aſſociation could affect them; becauſe this muſt ceaſe to be excited into action on the inſtant that the cutaneous capillaries ceaſe to act; whence in the firſt moment of contact of the cold water the cutaneous capillaries ceaſe to act from defect of irritation; which is cauſed by defect of the ſtimulus of heat; and in the ſecond moment the capillaries of the lungs ceaſe to act from the defect of aſſociation; which is cauſed by the defect of the motions of the cutaneous capillaries. Thus the univerſal torpor in the cold paroxyſm of fever is an example of direct ſympathy, though occaſioned in part by defect of irritation, and in part by defect of aſſociation.

5. Thus in walking out in a froſty morning the ſkin is cooled by the contact of the cold air, whence the actions of its capillaries are diminiſhed for want of their uſual ſtimulus of heat to excite a ſufficient quantity of the ſenſorial power of irritation. Hence there is at firſt a ſaving of ſenſorial power of irritation for the purpoſe of actuating the other parts of the ſyſtem with greater energy. Secondly the ſenſorial power of aſſociation, which uſed to be excited by the

motions of the cutaneous capillaries, is now not ſo powerfully excited; and in conſequence the parts, which conſtitute the next links of the circles of aſſociated motions, are for a time actuated with leſs energy, and a temporary general chillneſs ſucceeds; which is ſo far ſimilar to the cold fit of intermittent fever.

In this ſituation there is a curious circumſtance occurs, which merits peculiar attention: after a ſhort time, though the external ſkin continues cool by its expoſure to the cold air, and the actions of its capillaries are conſequently diminiſhed, yet the capillaries of the ſtomach act with greater energy; as is known by increaſed digeſtion and conſequent hunger. This is to be aſcribed to the accumulation of the ſenſorial power of irritation, which now excites by its ſuperabundance, or overflowing, as it were, the ſtomach into increaſed action; though it is at the ſame time excited leſs powerfully than uſual by the ſenſorial power of aſſociation. Thus the accumulation of the ſenſorial power of irritation in the veſſels of the ſkin increaſes in this caſe the action of the ſtomach, in the ſame manner as an accumulation of the ſenſorial power of aſſociation in the heart and arteries in fevers with weak pulſe increaſes the action of the capillaries.

If nevertheleſs the coldneſs of the ſkin be too long continued, or exiſts in too great a degree, ſo as in ſome meaſure to impair the life of the part, no further accumulation of the ſenſorial power of irritation occurs; and in conſequence the actions of the ſtomach become leſs than natural by the defect of the ſenſorial power of aſſociation; which has ceaſed to be excited by the want of action of the cutaneous capillaries. Whence continued coldneſs of the feet is accompanied with indigeſtion and heartburn. See Claſs IV. 2. 1. 6.

6. Similar to this when the actions of the ſtomach are rendered torpid by the previous ſtimulus of a violent emetic, and its motions become retrograde in conſequence, a great quantity of ſenſorial power is exerted on the lymphatics of the lungs, and other parts of the body; which excites them into greater direct action, as is evinced by the exhibition of digitalis in anaſarca. In this ſituation I ſuppoſe the emetic drug ſtimulates the muſcular fibres of the ſtomach into too great action; and that in conſequence a great torpor ſoon ſucceeds; and that this inaction of the muſcular parts of the ſtomach is not followed by much accumulation of the ſenſorial power of irritation; becauſe that ſenſorial power is in great meaſure exhauſted by the previous exceſſive ſtimulus. But the lymphatics of the ſtomach have their actions leſſened by defect of the ſenſorial power of aſſociation, which is not now excited into action, owing to the leſſened motions of the muſcular parts of it, with which the lymphatics are aſſociated. The ſenſorial power of aſſociation becomes therefore accumulated in theſe lymphatics of the ſtomach, becauſe it is not

excited into action; exactly as the power of irritation becomes accumulated in the hand, when immerſed in ſnow; and this accumulated ſenſorial power of aſſociation excites the lymphatics of the lungs and of other parts, which are moſt nearly aſſociated with thoſe of the ſtomach, into more energetic actions. Thus the muſcular fibres of the ſtomach act with the lymphatics of that organ in direct ſympathy; and the lymphatics of the ſtomach act in reverſe ſympathy with thoſe of the lungs and of other parts of the body; the former of which is cauſed by defect of the excitement of the ſenſorial power of aſſociation, and the latter by the accumulation of it.

Beſides the efficient cauſe, as above explained, the final cauſe, or convenience, of theſe organic actions are worthy our attention. In this caſe of an acrid drug ſwallowed into the ſtomach the reverted actions of the muſcular fibres of the ſtomach tend to eject its enemy; the reverted actions of its lymphatics pour a great quantity of fluids into the ſtomach for the purpoſe of diluting or waſhing off the noxious drug; and the increaſed actions of the other lymphatics ſupply theſe retrograde ones of the ſtomach with an inconceivable ſupply of fluids, as is ſeen in Ileus and Cholera.

7. The inquiſitive reader will excuſe my continuing this ſubject, though perhaps with ſome repetitions, as it envelopes the very eſſence of fever. When the firſt link of a train of actions is excited by exceſſive

ſtimulus, or exceſſive irritability, and thus acts with unuſual energy by the increaſed quantity of irritation, theſe increaſed motions excite a greater quantity of the ſenſorial power of aſſociation, which cauſes increaſed motions in the ſecond link, which is catenated with the firſt; and then the exceſſive action of this ſecond link excites alſo a greater quantity of the ſenſorial power of aſſociation, which increaſes the motions of the third link of this chain of aſſociation, and thus the increaſe of the ſtimulus on the irritative motions, to which the chain of aſſociation is catenated, increaſes the action of the whole chain or circle of aſſociated motions.

After a time the irritative motions become torpid by expenditure of the ſenſorial power of irritation, and then the power of aſſociation alſo becomes leſs exerted, both becauſe it has been in part exhauſted by too great action, and is now leſs excited by the leſſened action of the irritative motions, which uſed to excite it. Theſe are both inſtances of direct ſympathy, and frequently conſtitute the cold and hot fit of intermittents.

But though the accumulation of the ſenſorial power of irritation during the quieſcence of ſome motion owing to want of ſtimulus generally induces torpor in the firſt link of the train of aſſociated motions catenated with it; as the capillaries of the lungs become torpid immediately on immerſion of the ſkin into cold water; yet in ſome ſituations an orgaſm or exceſs of action is produced in the firſt link of the aſſociated motions thus catenated with irritative ones; as in the increaſed action of the ſtomach, when the ſkin is for a time expoſed to cold air; which may in part be aſcribed to the general increaſe of action of the whole ſyſtem, owing to the diminiſhed expenditure of ſenſorial power, but particularly of the parts, which have habitually acted together; as when one arm is paralytic the other is liable to more frequent or almoſt continual motion; and when one eye becomes blind the other frequently becomes ſtronger; which is well known to farriers, who are ſaid ſometimes to deſtroy the ſight of one eye to ſtrengthen that of the other in diſeaſed horſes.

Hence there is ſometimes a direct ſympathy, and ſometimes a reverſe one ſucceeds the torpor occaſioned by defect of ſtimulus, the latter of which is perhaps owing to a certain time being required for the production of an accumulation of the ſenſorial power of irritation by the nervous branches of the torpid organ; which accumulation is now in part or entirely derived to the next link of the aſſociation. Thus in going into a coldiſh bath, as into a river in the ſummer months, we at firſt experience a difficulty of breathing from the torpid action of the pulmonary capillaries, owing to the deficient excitement of the ſenſorial power of aſſociation in conſequence of the torpor of the cutaneous capillaries. But in a very ſhort time, as in one minute, the ſenſorial power of irritation becomes accumulated by the inactivity of the cutaneous capillaries; and as its ſuperabundance becomes now expended on the pulmonary capillaries, the difficult reſpiration ceaſes; though the cutaneous capillaries continue torpid by their contact with the cold water, and conſequently the ſenſorial power of aſſociation, which uſed to contribute to actuate the pulmonary capillaries, is leſs excited.

8. In like manner when there exiſts an accumulation of the ſenſorial power of aſſociation, owing to defect of its excitement by ſome previous irritative or aſſociate motions, it is generally accompanied for a certain time by a torpor not only of the link firſt affected, but of the ſubſequent parts, or of the whole train of aſſociated motions, as in the cold fits of intermittent fevers. Yet after a time an increaſed action of the next links of aſſociated motions ſucceeds the torpor of the firſt, as the abſorbent veſſels of the lungs act more violently in conſequence of the deficient action of thoſe of the ſtomach; and the ſkin at the commencement of ſickneſs is pale and cold, but in a little time becomes fluſhed and warm.

Thus we ſee in aſſociate motions, which are rendered torpid by defect of excitement, that ſometimes a direct, and ſometimes a reverſe ſympathy ſucceeds in the ſubſequent links of the chain. But I believe where a torpor of irritative or of the aſſociate motions is cauſed by a previous too great expenditure or exhauſtion of the ſenſorial powers of irritation or aſſociation, no increaſe of action in the ſubſequent link ever occurs, or not till after a very long time.

Thus when the ſtomach becomes torpid by previous violent exertion, and conſequent exhauſtion of the ſenſorial power of irritation, as after intoxication with wine or opium, or after the exhibition of ſome violent emetic drug, the torpor is communicated to the heart and arteries, as in continued fevers with weak pulſe. But where the torpor of the ſtomach is produced from defective aſſociation, as in ſea-ſickneſs; or in the ſickneſs which occurs, when a ſtone ſtimulates the ureter; no torpor is then communicated to the heart and arteries. For in the former caſe there is no accumulation of ſenſorial power in the ſtomach, which was previouſly exhauſted by too great ſtimulus; but in the latter caſe the accumulation of ſenſorial power in the ſtomach during its torpor is evinced by this circumſtance; that in ſea-ſickneſs the patients eat and drink voraciouſly at intervals; and the pulſe is generally not affected by the ſickneſs occaſioned by a ſtone in the ureter. For the action of the ſtomach is then leſſened, and in conſequence becomes retrograde, not owing to the exhauſtion of the ſenſorial power of irritation, but to the want of excitement of the ſenſorial power of aſſociation; which is cauſed by the defective action of the ureter, which becomes occaſionally torpid by the great ſtimulus of the ſtone it contains; or which is cauſed by the great exhauſtion of ſenſorial power by the pain; which affects the ureter without exciting inflammation, or increaſed action of it.

9. Thus though the ſtomach after the great ſtimulus of intoxication from exceſs of wine or opium will

continue many hours without accumulation of ſenſorial power, as appears from the patient's experiencing no appetite at the intervals of ſickneſs; yet after long abſtinence from food, at length not only the exhauſted quantity of ſenſorial power is renewed, but an accumulation of it at length occurs, and hunger returns. In this ſituation the ſtomach is generally about a whole day before it regains its uſual powers of digeſtion; but if it has been ſtill more violently ſtimulated, and its actions further impaired, a ſtill more permanent torpor along with a continued fever with weak pulſe is liable to occur; and a fourth part, or a half, or three fourths, or a whole lunar period paſſes, before it recovers its due irritability and conſequent action.

In ſimilar manner, after a perſon has been confined in a very warm room for ſome hours, the cutaneous capillaries, with their ſecretory and abſorbent veſſels, become exhauſted of their ſenſorial power of irritation by the too great violent exertions occaſioned by the unuſual ſtimulus of heat; and in coming into a colder atmoſphere an inactivity of the cutaneous veſſels exiſts at firſt for ſome time without accumulation of ſenſorial power; as is ſhewn by the continuance of the pain of cold and the paleneſs; but after a time both the pain of cold and paleneſs vaniſh, which now indicates an accumulation of the ſenſorial power of irritation, as leſs degrees of heat ſtimulate the ſyſtem into due action.

In the ſame manner, after any one has been ſome time in the ſummer ſunſhine, on coming into a dark cell he continues much longer before he can clearly diſtinguiſh objects, than if his eyes had only been previouſly expoſed to the light of a cloudy day in winter; becauſe the ſenſorial power of irritation, and conſequent ſenſation, had in the firſt caſe been previouſly much expended or exhauſted; and therefore required a much longer time before it could be produced in the brain, or derived to the optic nerves, in ſuch quantity as to reſtore the deficiency, and to cauſe an accumulation of it; whereas in the latter caſe no deficiency had occurred.

10. Thus the accumulation or deficiency of ſenſorial power in a torpid organ, which had previouſly been accuſtomed to perpetual action, depends on the manner in which it becomes torpid; that is, whether by great previous ſtimulus, or great previous excitement of the power of aſſociation; or by defect of its accuſtomed ſtimulus, or of its accuſtomed excitement of the power of aſſociation. In the former caſe the ſenſorial power is in an exhauſted ſtate, and therefore is not likely to become ſo ſoon accumulated, as after drunkenneſs, or expoſure to great heat, or to great light; in the latter a great accumulation of ſenſorial power occurs, as after expoſure to cold, or hunger, or darkneſs.

Hence when the ſtomach continues torpid by previous violent ſtimulus, as in the exhibition of digitalis, no accumulation of ſenſorial power of irritation ſupervenes; and in conſequence the motions of the heart and arteries, which are aſſociated with thoſe of the

ſtomach,

ſtomach, become weak, and ſlow, and intermittent, from the defect of the excitement of the ſenſorial power of aſſociation. But what follows? as the actions of the heart and arteries are leſſened by the deficient action of the ſenſorial power of aſſociation, and not by previous increaſed excitement of it; a great accumulation of the ſenſorial power of aſſociation occurs, which is exerted on the pulmonary and cutaneous abſorbents by reverſe ſympathy, and produces a great abſorption of the fluid effuſed into the cellular membrane in anaſarca, with dry ſkin; conſtituting one kind of atrophy.

But if at the ſame time the ſecerning veſſels of the ſtomach are ſtimulated into ſo violent activity as to induce great conſequent torpor, as probably happens when contagious matter is ſwallowed into the ſtomach with our ſaliva, thoſe of the heart and arteries act feebly from the deficient excitement of the power of aſſociation; and then the cutaneous and pulmonary ſecerning veſſels act with greater force than natural, owing to the accumulation of the ſenſorial power of aſſociation; and unnatural heat of the ſkin, and of the breath ſucceed; but without frequency of pulſe, conſtituting the pareſis irritativa of Claſs I. 2. 1. 2. And laſtly, if a paucity of blood attends this pareſis, or ſome other cauſe inducing a frequency of pulſe, the febris inirritativa, or fever with weak pulſe, is produced.

But on the contrary when the ſtomach has previouſly been rendered torpid by defect of ſtimulus, as by hunger, if food be too haſtily ſupplied, not only great exertion of the ſtomach itſelf ſucceeds, but fever with ſtrong pulſe is induced in conſequence; that is, the heart and arteries are excited into more energetic action by the exceſs of the power of aſſociation, which catenates their motions with thoſe of the ſtomach. For the redundancy of ſenſorial power of irritation, which was accumulated during the inactivity of the ſtomach, and is now called into action by ſtimulus, actuates that organ with increaſed energy, and excites by theſe increaſed motions the ſenſorial power of aſſociation; which has alſo been accumulated during the inactivity of the heart and arteries; and thus theſe organs alſo are now excited into greater action.

So after the ſkin has been expoſed ſome hours to greater heat than natural in the warm room, other parts, as the membranes of the noſtrils, or of the lungs, or of the ſtomach, are liable to become torpid from direct ſympathy with it, when we come into air of a moderate temperature; whence catarrhs, coughs, and fevers. But if this torpor be occaſioned by defect of ſtimulus, as after being expoſed to froſty air, the accumulation of ſenſorial power is exerted, and a glow of the ſkin follows, with increaſed digeſtion, full reſpiration, and more vigorous circulation.

11. It may be aſked, Why is there a great and conſtant accumulation of the ſenſorial power of aſſociation, owing to the torpor of the ſtomach and

heart and arteries, in continued fever with weak pulſe; which is exerted on the cutaneous and pulmonary capillaries, ſo as to excite them into increaſed action for many weeks, and yet no ſuch exuberance of ſenſorial power produces fever in winter-ſleeping animals, or in chloroſis, or apepſia, or hyſteria?

In winter-ſleeping animals I ſuppoſe the whole nervous ſyſtem is torpid, or paralyſed, as in the ſleep of frozen people; and that the ſtomach is torpid in conſequence of the inactivity or quieſcence of the brain; and that all other parts of the body, and the cutaneous capillaries with the reſt, labour under a ſimilar torpor.

In chloroſis, I imagine, the actions of the heart and arteries, as well as thoſe of the cutaneous and pulmonary capillaries, ſuffer along with thoſe of the ſtomach from the deficient ſtimulus of the pale blood; and that though the liver is probably the ſeat of the original torpor in this diſeaſe, with which all other parts ſympathize from defect of the excitation of the ſenſorial power of aſſociation; yet as this torpor occurs in ſo ſmall a degree as not to excite a ſhuddering or cold fit, no obſervable conſequences are in general occaſioned by the conſequent accumulation of ſenſorial power. Sometimes indeed in chloroſis there does occur a frequent pulſe and hot ſkin; in which circumſtances I ſuppoſe the heart and arteries are become in ſome degree torpid by direct ſympathy with the torpid liver; and that hence not only the pulſe becomes frequent, but the capillaries of the ſkin act more violently by reverſe ſympathy with the heart and arteries, owing to the accumulation of the ſenſorial power of aſſociation in them during their torpid ſtate, as occurs in irritative fever. See Article 11 of this Supplement.

In apepſia chronica the actions of the ſtomach are not ſo far impaired or deſtroyed as totally to prevent the excitation of the ſenſorial power of aſſociation, which therefore contributes ſomething towards the actions of the heart and arteries, though leſs than natural, as a weak pulſe always I believe attends this diſeaſe.

There is a torpor of the ſtomach, and of the upper part of the alimentary canal in hyſteria, as is evident from the retrograde actions of the duodenum, ſtomach, and œſophagus, which conſtitute the globus hyſtericus, or ſenſation of a globe riſing into the throat. But as theſe retrograde actions are leſs than thoſe, which induce ſickneſs or vomiting, and are not occaſioned by previous exhauſtion of the ſenſorial power of irritation, they do not ſo totally prevent the excitement of the ſenſorial power of aſſociation, as to leſſen the motion of the heart and arteries ſo much as to induce fever; yet in this caſe, as in apepſia, and in chloroſis, the pulſations of the heart and arteries are weaker than natural, and are ſometimes attended with occaſionally increaſed action of the capillaries; as appears from the fluſhings of the face, and hot ſkin, which generally form an evening febricula in diſeaſes attended with weak digeſtion.

12. The increaſed action, or orgaſm, of the cutaneous, pulmonary, and cellular capillaries, with their ſecerning and abſorbent veſſels, in thoſe fevers which are attended with deficiency of vital action, exhauſts the patient both by the additional expenditure of ſenſorial power on thoſe organs of ſecretion, and by the too great abſorption of the mucus and fat of the body; whence great debility and great emaciation. Hence one great indication of cure of continued fever with arterial debility is to diminiſh the too great action of the capillaries; which is to be done by frequent ablutions, or bathing the whole ſkin in tepid or in cold water, as recommended by Dr. Currie of Liverpool (Philoſ. Tranſ. for 1792), for half an hour, twice a day, or at thoſe times when the ſkin feels drieſt and hotteſt. Much cool air ſhould alſo be admitted, when the breath of the patient feels hot to one's hand; or when the tongue, eſpecially its middle part, is dry, and covered with a cruſt of indurated mucus; as theſe indicate the increaſed action of the pulmonary capillaries; in the ſame manner as the dry and hot ſkin indicates the orgaſm of the cutaneous capillaries; and the emaciation of the body that of the cellular ones.

For this purpoſe of abating the action of the capillaries by frequent ablution or fomentation, water of any degree of heat beneath that of the body will be of ſervice, and ought in accurate language to be called a cold bath; but the degree of coldneſs, where the patient is ſenſible, ſhould in ſome meaſure be governed by his ſenſations; as it is probable, that the degree of coldneſs, which is moſt grateful to him, will alſo be of the greateſt benefit to him. See Claſs III. 2. 1. 12. and Article 15 of this Supplement.

Another great uſe of frequent ablutions, or fomentations, or baths, in fevers, where the ſtomach is in ſome degree torpid, is to ſupply the ſyſtem with aqueous fluid by means of the cutaneous abſorbents; which is diſſipated faſter by the increaſed action of the ſecerning capillaries, than the ſtomach can furniſh, and occaſions great thirſt at the intervals of the ſickneſs.

IX. *Torpor of the Lungs.*

1. The lungs in many caſes of contagion may firſt be affected with torpor, and the ſkin become cold by ſympathy; in the ſame manner as a cold ſkin on going into the cold bath induces difficulty of breathing. Or the ſtomach may become affected with torpor by its ſympathy with the lungs, as in the experiments of Mr. Watt with hydro-carbonate gas; a few reſpirations of which induced ſickneſs, and even ſyncope. When the ſtomach or ſkin is thus affected ſecondarily by aſſociation, an accumulation of ſenſorial power occurs much ſooner, than when theſe parts become torpid in conſequence of previous exceſs of ſtimulus; and hence they ſooner recover their accuſtomed action, and the fever ceaſes. The particles of contagious matter thus received by reſpiration ſome-

what reſemble in their effects the acid gaſes from burning ſulphur, or from charcoal; which, if they do not inſtantly deſtroy, induce a fever, and the patient ſlowly recovers.

2. I was ſome years ago ſtooping down to look, which way the water oozed from a moraſs, as a labourer opened it with a ſpade, to detect the ſource of the ſpring, and inhaled a vapour, which occaſioned an inſtant ſenſe of ſuffocation. Immediately recoiling I believe I inhaled it but once; yet a few hours afterwards in the cool of the evening, when I returned home rather fatigued and hungry, a ſhivering and cold fit occured, which was followed by a hot one; and the whole diſeaſe began and terminated in about twelve hours without return. In this caſe the power of fear, or of imagination, was not concerned; as I neither thought of the bad air of a moraſs before I perceived it; nor expected a fever-fit, till it occurred.

In this caſe the torpor commenced in the lungs, and after a few hours, by the addition of fatigue, and cold, and hunger, was propagated by direct ſympathy to the reſt of the ſyſtem. An orgaſm or increaſed action of the whole ſyſtem was then induced by the accumulation of ſenſorial power of irritation in the lungs, and of aſſociation in the other organs; and when theſe ſubſided, the diſeaſe ceaſed. It may be aſked, could a torpor of the capillaries of the air-veſſels of the lungs be ſo ſuddenly produced by great ſtimulation?

lation?—It appears probable, that it might, becauſe great exertion of irritative motions may be inſtantly produced without our perceiving them; that is, without their being attended by ſenſation, both in the lungs and ſtomach; and the organs may become torpid by the great expenditure of the ſenſorial power of irritation in an inſtant of time; as paralyſis frequently inſtantly follows too great an exertion of voluntary power.

3. When the capillaries of the lungs act too violently, as in ſome continued fevers; which is known by the heat of the breath, and by the dryneſs of the tongue, eſpecially of the middle part of it; not only cooler air might be admitted more freely into a ſick room to counteract this orgaſm of the pulmonary capillaries; but perhaps the patient might breathe with advantage a mixture of carbonic acid gas, or of hydrogene gas, or of azote with atmoſpheric air. And on the contrary, when there exiſts an evident torpor of the pulmonary capillaries, which may be known by the correſpondent chillneſs of the ſkin; and by a tickling cough, which ſometimes attends cold paroxyſms of fever, and is then owing to the deficient abſorption of the pulmonary mucus, the ſaline parts of which ſtimulate the bronchiæ, or air-veſſels; a mixture of one part of oxygen gas with 10 or 20 parts of atmoſpheric air might probably be breathed with great advantage.

X. *Torpor of the Brain.*

As the inactivity or torpor of the abſorbent veſſels of the brain is the cauſe of hydrocephalus internus; and as the deficiency of venous abſorption in the brain, or torpor of the extremities of its veins, is believed frequently to be the cauſe of apoplexies; ſo there is reaſon to conclude, that the torpor of the ſecerning veſſels of the brain, which are ſuppoſed to produce the ſenſorial power, may conſtitute the immediate cauſe of ſome fevers with arterial debility. And alſo that the increaſed action of theſe ſecerning veſſels may ſometimes conſtitute the immediate cauſe of fevers with arterial ſtrength.

It is nevertheleſs probable, that the torpor or orgaſm of the ſanguiferous, abſorbent, or ſecerning veſſels of the brain may frequently exiſt as a ſecondary effect, owing to their aſſociation with other organs, as the ſtomach or lungs; and may thus be produced like the torpor of the heart and arteries in inirritative fevers, or like the orgaſm of thoſe organs in irritative fevers, or inflammatory ones.

Where there exiſts a torpor of the brain, might not very ſlight electric ſhocks paſſed frequently through it in all directions be uſed with advantage? Might not fomentations of 94 or 96 degrees of heat on the head for an hour at a time, and frequently repeated, ſtimulate the brain into action; as in the revival of winter-ſleeping animals by warmth? Ether externally might be frequently applied, and a bliſter on the ſhaved head.

Where the ſecerning veſſels of the brain act with too great energy, as in ſome inflammatory fevers, might it not be diminiſhed by laying the patient horizontally on a mill-ſtone, and whirling him, till ſleep ſhould be produced, as the brain becomes compreſſed by the centrifugal force? See Article 15 of this Supplement.

XI. *Torpor of the Heart and Arteries.*

1. It was ſhewn in Claſs IV. 1. 1. 6. in IV. 2. 1. 2. and in Suppl. I. 6. 3. that a reverſe ſympathy generally exiſts between the lacteal and lymphatic branches of the abſorbent ſyſtem. Hence, when the motions of the abſorbents of the ſtomach are rendered torpid or retrograde in fevers with arterial debility, thoſe of the ſkin, lungs, and cellular membrane, act with increaſed energy. But the actions of the muſcular fibres of the heart and arteries are at the ſame time aſſociated with thoſe of the muſcular fibres of the ſtomach by direct ſympathy. Both theſe actions occur during the operation of powerful emetics, as ſquill, or digitalis; while the motions of the ſtomach continue torpid or retrograde, the cellular and cutaneous abſorbents act with greater energy, and the pulſations of the heart and arteries become weaker, and ſometimes ſlower.

2. The increaſed action of the ſtomach after a meal, and of the heart and arteries at the ſame time from

the ſtimulus of the new ſupply of chyle, ſeems originally to have produced, and to have eſtabliſhed, this direct ſympathy between them. As the increaſed action of the abſorbents of the ſtomach after a meal has been uſually attended with diminiſhed action of the other branches of the abſorbent ſyſtem, as mentioned in Claſs IV. 1. 1. 6. and has thus eſtabliſhed a reverſe ſympathy between them.

3. Beſides the reverſe ſympathy of the abſorbent veſſels and the muſcles of the ſtomach, and of the heart and arteries, with thoſe of the ſkin, lungs, and cellular membrane; there exiſts a ſimilar reverſe ſympathy between the ſecerning veſſels or glands of the former of theſe organs with thoſe of the latter; that is the mucous glands of the heart and arteries act generally by direct ſympathy with thoſe of the ſtomach; and the mucous glands of the cellular membrane of the lungs, and of the ſkin, act by reverſe ſympathy with them both.

Hence when the ſtomach is torpid, as in ſickneſs, this torpor ſometimes only affects the abſorbent veſſels of it; and then the abſorbents of the cellular membrane and the ſkin only act with increaſed energy by reverſe ſympathy. If the torpor affects the muſcular fibres of the ſtomach, thoſe of the heart and arteries act by direct ſympathy with it, and a weak pulſe is produced, as in the exhibition of digitalis, but without increaſe of heat. But if the torpor alſo affects the glands of the ſtomach, the cutaneous and pulmonary glands act with greater energy by their reverſe ſympathy with thoſe of the ſtomach, and of the heart and arteries; and great heat is produced along with increaſed perſpiration both from the ſkin and lungs.

3. There is ſome difficulty in explaining, why the actions of the extenſive ſyſtem of capillary glands, which exiſt on every other membrane and cell in the body for the purpoſe of ſecreting mucus and perſpirable matter, ſhould ſo generally act by reverſe ſympathy with thoſe of the ſtomach and upper part of the inteſtines. It was ſhewn in Claſs IV. 1. 1. 6. that when the ſtomach was filled with ſolid and fluid aliment, the abſorbents of the cellular membrane, and of the bladder, and of the ſkin acted with leſs energy; as the fluids, they were uſed to abſorb and tranſmit into the circulation, were now leſs wanted; and that hence by habit a reverſe ſympathy obtained between theſe branches of the abſorbents of the alimentary canal, and thoſe of the other parts of the body.

Now, as at this time leſs fluid was abſorbed by the cutaneous and cellular lymphatics, it would happen, that leſs would be ſecreted by their correſpondent ſecerning veſſels, or capillary glands; and that hence by habit, theſe ſecerning veſſels would acquire a reverſe ſympathy of action with the ſecerning veſſels of the alimentary canal.

Thus when the abſorption of the tears by the puncta lacrymalia is much increaſed by the ſtimulus of ſnuff; or of an affecting idea, on the naſal ducts, as explained in Sect. XVI. 8. 2. a great increaſe of the ſecretion of tears from the lacrymal glands is produced by the direct ſympathy of the action of theſe glands with thoſe of their correſpondent abſorbents; and that though in this caſe they are placed at ſo great a diſtance from each other.

4. A difficult queſtion here occurs; why does it happen, that in fevers with weak pulſe the contractions of the heart and arteries become at the ſame time more frequent; which alſo ſometimes occurs in chloroſis, and in ſome hyſteric and hypochondriac diſeaſes, and in ſome inſanities; yet at other times the weak pulſe becomes at the ſame time ſlow, as in the exhibition of digitalis, and in pareſis irritativa, deſcribed in Claſs I. 2. 1. 2. which may be termed a fever with ſlow pulſe? this frequency of pulſe cannot depend on heat, becauſe it ſometimes exiſts without heat, as towards the end of ſome fevers with debility.

Now as apoplexies, which are ſometimes aſcribed to fulneſs of blood, are attended with ſlow pulſe; and as in animals dying in the ſlaughter houſe from deficiency of blood the pulſe becomes frequent in extreme; may not the frequency of pulſe in fevers with arterial debility be in general owing to paucity of blood? as explained in Sect. XXXII. 2. 3. and its ſlowneſs in pareſis irritativa be cauſed by the debility being accompanied with due quantity of blood? or may not the former circumſtance ſometimes depend on a concomitant affection of the brain approaching to ſleep? or to the unuſual facility of the paſſage of the blood through the pulmonary and aortal capillaries? in which circumſtance the heart may completely empty itſelf at each pulſation, though its contractions may be weak. While the latter depends on the difficulty of the paſſage of the blood through the pulmonary or aortal capillaries, as in the cold fits of intermittents, and in ſome palpitations of the heart, and in ſome kinds of hæmoptoe? in theſe caſes the increaſed reſiſtance prevents the heart from emptying itſelf, and in conſequence a new diaſtole ſooner occurs, and thus the number of pulſations becomes greater in a given time.

5. In reſpect to the ſympathies of action, which produce or conſtitute fever with debility, the ſyſtem may be divided into certain provinces, which are aſſentient or oppoſite to each other. Firſt, the lacteals or abſorbent veſſels of the ſtomach, and upper part of the inteſtines; ſecondly, the lymphatics or all the other branches of the abſorbent veſſels, which ariſe from the ſkin, mucous membranes, cellular membranes, and the various glands. Theſe two diviſions act by reverſe ſympathy with each other in the hot fits of fever with debility, though by direct ſympathy in the cold ones. The third diviſion conſiſts of the ſecerning veſſels of the ſtomach and upper inteſtines; and the fourth of the ſecerning veſſels of all the other parts of the body, as the capillary glands of the ſkin,

lungs, and cellular membrane, and the various other glands belonging to the ſanguiferous ſyſtem. Many of theſe frequently, but the capillaries always, act by reverſe ſympathy with thoſe of the third diviſion above mentioned in the hot fits of fever with debility, though by direct ſympathy with them in the cold fits. Fifthly, the muſcular fibres of the ſtomach, and upper inteſtines; and ſixthly, the muſcular fibres of the heart and arteries. The actions of theſe two laſt diviſions of moving fibres act by direct ſympathy with each other, both in the cold and hot fits of fevers with debility.

The efficient cauſe of thoſe apparent ſympathies in fevers with weak pulſe may be thus underſtood. In the cold paroxyſm of fever with weak pulſe the part firſt affected I believe to be the ſtomach, and that it has become torpid by previous violent exertion, as by ſwallowing contagious matter mixed with ſaliva, and not by defect of ſtimulus, as from cold or hunger. The actions of this important organ, which ſympathizes with almoſt every part of the body, being thus much diminiſhed or nearly deſtroyed, the ſenſorial power of aſſociation is not excited; which in health contributes to move the heart and arteries, and all the reſt of the ſyſtem; whence an univerſal torpor occurs.

When the hot fit approaches, the ſtomach in fevers with ſtrong pulſe regains its activity by the accumulation of the ſenſorial power of either irritation, if it was the part firſt affected, or of aſſociation if it was affected in ſympathy with ſome other torpid part, as the ſpleen or liver; which accumulation is produced during its torpor. At the ſame time all the other parts of the ſyſtem acquire greater energy of action by the accumulation of the ſenſorial power of aſſociation, which was produced, during their inactivity in the cold fit.

But in fevers with weak pulſe the ſtomach, whoſe ſenſorial power of irritation had been previouſly exhauſted by violent action, acquires no ſuch quick accumulation of ſenſorial power, but remains in a ſtate of torpor after the hot fit commences. The heart and arteries remain alſo in a ſtate of torpor, becauſe there continues to be no excitement of their power of aſſociation owing to the torpid motions of the ſtomach; but hence it happens, that there exiſts at this time a great accumulation of the power of aſſociation in the leſs active fibres of the heart and arteries; which, as it is not excited and expended by them, increaſes the aſſociability of the next link of the aſſociated chain of motions, which conſiſts of the capillaries or other glands; and that in ſo great a degree as to actuate them with unnatural energy, and thus to produce a perpetual hot fit of fever. Becauſe the aſſociability of the capillaries is ſo much increaſed by the accumulation of this power, owing to the leſſened activity of the heart and arteries, as to over-balance the leſſened excitement of it by the weaker movements of the heart and arteries.

6. When the accumulation of the ſenſorial power of irritation cauſed by defect of ſtimulus is greater in the firſt link of a train of actions, to which aſſociated motions are catenated, than the deficiency of the excitement of the ſenſorial power of aſſociation in the next link, what happens?—the ſuperabundance of the unemployed ſenſorial power of the firſt link is derived to the ſecond; the aſſociability of which thus becomes ſo greatly increaſed, that it acts more violently than natural, though the excitement of its power of aſſociation by the leſſened action of the firſt link is leſs than natural. So that in this ſituation the withdrawing of an accuſtomed ſtimulus in ſome parts of the ſyſtem will decreaſe the irritative motions of that part, and at the ſame time occaſion an increaſe of the aſſociate motion of another part, which is catenated with it.

This circumſtance nevertheleſs can only occur in thoſe parts of the ſyſtem, whoſe natural actions are perpetual, and the accumulation of ſenſorial power on that account very great, when their activity is much leſſened by the deduction of their uſual ſtimulus; and are therefore only to be found in the ſanguiferous ſyſtem, or in the alimentary canal, or in the glands and capillaries. Of the firſt of which the following is an inſtance.

The reſpiration of a reduced atmoſphere, that is of air mixed with hydrogene or azote, quickens the pulſe, as obſerved in the caſe of Mrs. Eaton by Dr. Reynolds and Dr. Thornton; to which Dr. Beddoes adds in a note, that "he never ſaw an inſtance in which a lowered atmoſphere did not at the moment quicken the pulſe, while it weakened the action of the heart and arteries." Conſiderations on Factitious Airs, by Thomas Beddoes and James Watt, Part III. p. 67. Johnſon, London. By the aſſiſtance of this new fact the curious circumſtance of the quick production of warmth of the ſkin on covering the head under the bed-clothes, which every one muſt at ſome time have experienced, receives a more ſatisfactory explanation, than that which is given in Claſs IV. 1. 1. 2. which was printed before this part of Dr. Beddoes's Conſiderations was publiſhed.

For if the blood be deprived of its accuſtomed quantity of oxygen, as in covering the head in bed, and thus breathing an air rendered impure by repeated reſpiration, or by breathing a factitious air with leſs proportion of oxygen, which in common reſpiration paſſes through the moiſt membranes of the lungs, and mixes with the blood, the pulſations of the heart and arteries become weaker, and conſequently quicker, by the defect of the ſtimulus of oxygen. And as theſe veſſels are ſubject to perpetual motion, the accumulation of the ſenſorial power of irritation becomes ſo great by their leſſened activity, that it excites the veſſels next connected, the cutaneous capillaries for inſtance, into more energetic actions, ſo as to produce increaſed heat of the ſkin, and greater perſpiration.

How exactly this reſembles a continued fever with weak and quick pulſe!—in the latter the action of the heart and arteries are leſſened by defect of the excitement of the ſenſorial power of aſſociation, owing to the torpor or leſſened actions of the ſtomach; hence the accumulation of the ſenſorial power of aſſociation in this caſe, as the accumulation of that of irritation in the former, becomes ſo abundant as to excite into increaſed action the parts moſt nearly connected, as the cutaneous capillaries.

In reſpect to the circumſtance mentioned by Sydenham, that covering the head in bed in a ſhort time relieved the pertinacious ſickneſs of the patient, it muſt be obſerved, that when the action of the heart and arteries become weakened by the want of the due ſtimulus of the proper quantity of oxygen in the blood, that an accumulation of the ſenſorial power of irritation occurs in the fibres of the heart and arteries, which then is expended on thoſe of the capillary glands, increaſing their actions and conſequent ſecretions and heat. And then the ſtomach is thrown into ſtronger action, both by the greater excitement of its natural quantity of the ſenſorial power of aſſociation by the increaſed actions of the capillaries, and alſo by ſome increaſe of aſſociability, as it had been previouſly a long time in a ſtate of torpor, or leſs activity than natural, as evinced by its perpetual ſickneſs.

In a manner ſomewhat ſimilar to this, is the redneſs of the ſkin produced in angry people by the ſuperabundance of the unemployed ſenſorial power of volition,

lition, as explained in Claſs IV. 2. 3. 5. Rubor ex irâ. From hence we learn how, when people in fevers with weak pulſe, or in dropſies, become inſane, the abundance of the unemployed ſenſorial power of volition increaſes the actions of the whole moving ſyſtem, and cures thoſe diſeaſes.

7. As the orgaſm of the capillaries in fevers with weak pulſe is immediately cauſed by the torpid actions of the heart and arteries, as above explained, this ſupplies us with another indication of cure in ſuch fevers, and that is to ſtimulate theſe organs. This may probably be done by ſome kind of medicines, which are known to paſs into the blood unchanged in ſome of their properties. It is poſſible that nitre, or its acid, may paſs into the blood and increaſe the colour of it, and thus increaſe its ſtimulus, and the ſame may be ſuppoſed of other ſalts, neutral or metallic? As rubia tinctoria, madder, colours the bones of young animals, it muſt paſs into the blood with its colouring matter at leaſt unchanged, and perhaps many other medicines may likewiſe affect the blood, and thus act by ſtimulating the heart and arteries, as well as by ſtimulating the ſtomach; which circumſtance deſerves further attention.

Another way of immediately ſtimulating the heart and arteries would be by transfuſing new blood into them. Is it poſſible that any other fluid beſides blood, as chyle, or milk, or water, could, if managed with great art, be introduced ſafely or advantageouſly into the vein of a living animal?

A third method of exciting the heart and arteries immediately is by increaſing the natural ſtimulus of the blood, and is well worthy experiment in all fevers with weak pulſe; and that conſiſts in ſupplying the blood with a greater proportion of oxygen; which may be done by reſpiration, if the patient was to breathe either oxygen gas pure, or diluted with atmoſpheric air, which might be given to many gallons frequently in a day, and by paſſing through the moiſt membranes of the lungs, according to the experiments of Dr. Prieſtley, and uniting with the blood, might render it more ſtimulant, and thus excite the heart and arteries into greater action! May not ſome eaſier method of exhibiting oxygen gas by reſpiration be diſcovered, as by uſing very ſmall quantities of hyper-oxygenated marine acid gas very much diluted with atmoſpheric air?

XII. *Torpor of the Stomach and upper Inteſtines.*

1. The principal circumſtance, which ſupports the increaſed action of the capillaries in continued fever with weak pulſe, is their reverſe ſympathy with thoſe of the ſtomach and upper inteſtines, or with thoſe of the heart and arteries. The torpor of the ſtomach and upper inteſtines is apparent in continned fevers from the total want of appetite for ſolid food, beſides the ſickneſs with which fevers generally commence, and the frequent diarrhœa with indigeſted ſtools, at the ſame time the thirſt of the patient is ſometimes urgent at the intervals of the ſickneſs. Why the ſtomach can at this time take fluids by intervals,

tervals, and not ſolids, is difficult to explain; except it be ſuppoſed, as ſome have affirmed, that the lacteal abſorbents are a different branch from the lymphatic abſorbents, and that in this caſe the former only are in a ſtate of permanent torpor.

2. The torpor of the heart and arteries is known by the weakneſs of the pulſe. When the actions of the abſorbents of the ſtomach are diminiſhed by the exhibition of ſmall doſes of digitalis, or become retrograde by larger ones, the heart and arteries act more feebly by direct ſympathy; but the cellular, cutaneous, and pulmonary abſorbents are excited into greater action. Whence in anaſarca the fluids in the cellular membrane throughout the whole body are abſorbed during the ſickneſs, and frequently a great quantity of atmoſpheric moiſture at the ſame time; as appears by the very great diſcharge of urine, which ſometimes happens in theſe caſes; and in ileus the prodigious evacuations by vomiting, which are often a hundred fold greater than the quantity ſwallowed, evince the great action of all the other abſorbents during the ſickneſs of the ſtomach.

3. But when the ſtomach is rendered permanently ſick by an emetic drug, as by digitalis, it is not probable, that much accumulation of ſenſorial power is ſoon produced in this organ; becauſe its uſual quantity of ſenſorial power is previouſly exhauſted by the great ſtimulus of the foxglove; and hence it ſeems

probable, that the great accumulation of ſenſorial power, which now cauſes the increaſed action of the abſorbents, is produced in conſequence of the inactivity of the heart and arteries; which inactivity is induced by deficient excitement of the ſenſorial power of aſſociation between thoſe organs and the ſtomach, and not by any previous exhauſtion of their natural quantity of ſenſorial power; whereas in ileus, where the torpor of the ſtomach, and conſequent ſickneſs, is induced by reverſe ſympathy with an inflamed inteſtine, that is, by diſſevered or defective aſſociation; the accumulation of ſenſorial power, which in that diſeaſe ſo violently actuates the cellular, pulmonary, and cutaneous abſorbents, is apparently produced by the torpor of the ſtomach and lacteals, and the conſequent accumulation of the ſenſorial power of aſſociation in them owing to their leſſened action in ſickneſs.

4. This accounts for the dry ſkin in fevers with weak pulſe, where the ſtomach and the heart and arteries are in a torpid ſtate, and for the ſudden emaciation of the body; becauſe the actions of the cellular and cutaneous abſorbents are increaſed by reverſe ſympathy with thoſe of the ſtomach, or with thoſe of the heart and arteries; that is by the expenditure of that ſenſorial power of aſſociation, which is accumulated in conſequence of the torpor of the ſtomach and heart and arteries, or of either of them; this alſo explains the ſudden abſorption of the milk in puerperal fevers; and contributes along with the heat of the

reſpired air to the dryneſs of the mucous membrane of the tongue and noſtrils.

5. Beſides the reverſe ſympathy, with which the abſorbent veſſels of the ſtomach and upper inteſtines act in reſpect to all the other abſorbent veſſels, as in the exhibition of digitalis, and in ileus; there is another reverſe ſympathy exiſts between the capillaries, or ſecretory veſſels of the ſtomach, and thoſe of the ſkin. Which may nevertheleſs be occaſioned by the accumulation of ſenſorial power by the torpor of the heart and arteries, which is induced by direct ſympathy with the ſtomach; thus when the torpor of the ſtomach remains in a fever-fit, which might otherwiſe have intermitted, the torpor of the heart and arteries remains alſo by direct ſympathy, and the increaſed cutaneous capillary action, and conſequent heat, are produced by reverſe ſympathy; and the fever is thus rendered continual, owing primarily to the torpor of the ſtomach.

6. The reverſe ſympathy, which exiſts between the capillaries of the ſtomach and the cutaneous capillaries, appears by the chillneſs of ſome people after dinner; and contrary-wiſe by the digeſtion being ſtrengthened, when the ſkin is expoſed to cold air for a ſhort time; as mentioned in Claſs IV. 1. 1. 4. and IV. 2. 1. 1. and from the heat and glow on the ſkin, which attends the action of vomiting; for though when ſickneſs firſt commences, the ſkin is pale and cold; as it then partakes of the general torpor, which induces

the ſickneſs; yet after the vomiting has continued ſome minutes, ſo that an accumulation of ſenſorial power exiſts in the capillaries of the ſtomach, and of the ſkin, owing to their diminiſhed action; a glow of the ſkin ſucceeds, with ſweat, as well as with increaſed abſorption.

7. Nevertheleſs in ſome circumſtances the ſtomach and the heart and arteries ſeem to act by direct ſympathy with the cutaneous capillaries, as in the fluſhing of the face and glow of the ſkin of ſome people after dinner; and as in fevers with ſtrong pulſe. In theſe caſes there appears to be an increaſed production of ſenſorial power, either of ſenſation, as in the bluſh of ſhame; or of volition, as in the bluſh of anger; or of irritation, as in the fluſhed face after dinner above mentioned.

This increaſed action of the capillaries of the ſkin along with the increaſed actions of the ſtomach and heart is perhaps to be eſteemed a ſynchronous increaſe of action, rather than a ſympathy between thoſe organs. Thus the fluſhing of the face after dinner may be owing to the ſecretion of ſenſorial power in the brain being increaſed by the aſſociation of that organ with the ſtomach, in a greater proportion than the increaſed expenditure of it, or may be owing alſo to the ſtimulus of new chyle received into the blood.

8. When the ſtomach and the heart and arteries are rendered torpid in fevers, not only the cutaneous, cellular, and pulmonary abſorbents are excited to act

with greater energy; but alſo their correſpondent capillaries and ſecerning veſſels or glands, eſpecially perhaps thoſe of the ſkin, are induced into more energetic action. Whence greater heat, a greater ſecretion of perſpirable matter, and of mucus; and a greater abſorption of them both, and of aerial moiſture. Theſe reverſe ſympathies coincide with other animal facts, as in eruption of ſmall pox on the face and neck the feet become cold, while the face and neck are much fluſhed; and in the hemiplagia, when one arm and leg become diſobedient to volition, the patient is perpetually moving the other. Which are well accounted for by the accumulation of ſenſorial power in one part of an aſſociated ſeries of actions, when leſs of it is expended by another part of it; and by a deficiency of ſenſorial power in the ſecond link of aſſociation, when too much of it is expended by the firſt.

9. This doctrine of reverſe ſympathy enables us to account for that difficult problem, why in continued fevers the increaſed action of the cutaneous, cellular, and pulmonary capillaries proceeds without interruption or return of cold fit; though perhaps with ſome exacerbations and remiſſions; and that during a quarter, or half, or three quarters, or a whole lunation; while at the ſame time the pulſations of the heart and arteries are weaker than natural.

To this ſhould be added the direct ſympathy, which exiſts between the periſtaltic motions of the fibres of the ſtomach, and the pulſations of the heart. And that the ſtomach has become torpid by the too great ſtimulus of ſome poiſonous or contagious matter; and this very intricate idea of continued fever with feeble pulſe is reduced to curious ſimplicity.

The direct ſympathy of the ſtomach and heart and arteries not only appears from the ſtronger and ſlower pulſe of perſons exhauſted by fatigue, after they have drank a glaſs of wine, and eaten a few mouthfuls; but appears alſo from the exhibition of large doſes of digitalis; when the patient labours under great and inceſſant efforts to vomit, at the ſame time that the actions of the abſorbent ſyſtem are known to be much increaſed by the haſty abſorption of the ſerous fluid in anaſarca, the pulſations of the heart become ſlow and intermittent to an alarming degree. See Claſs IV. 2. 1. 17 and 18.

10. It would aſſiſt us much in the knowledge and cure of fevers, if we could always determine, which part of the ſyſtem was primarily affected; and whether the torpor of it was from previous exceſs or defect of ſtimulus; which the induſtry of future obſervers muſt diſcover. Thus if the ſtomach be affected primarily, and that by previous exceſs of ſtimulus, as when certain quantities of opium, or wine, or blue vitriol, or arſenic, are ſwallowed, it is ſome time in recovering the quantity of ſenſorial power previouſly exhauſted by exceſs of ſtimulus, before any accumulation of it can occur. But if it be affected with torpor ſecondarily, by ſympathy with ſome diſtant part;

as with the torpid capillaries of the ſkin, that is by defective excitement of the ſenſorial power of aſſociation; or if it be affected by defect of ſtimulus of food or of heat; it ſooner acquires ſo much accumulation of ſenſorial power, as to be enabled to accommodate itſelf to its leſſened ſtimulus by increaſe of its irritability.

Thus in the hemicrania the torpor generally commences in a diſeaſed tooth, and the membranes about the temple, and alſo thoſe of the ſtomach become torpid by direct ſynchronous ſympathy; and pain of the head, and ſickneſs ſupervene; but no fever or quickneſs of pulſe. In this caſe the torpor of the ſtomach is owing to defect of the ſenſorial power of aſſociation, which is cauſed by the too feeble actions of the membranes ſurrounding the diſeaſed tooth, and thus the train of ſympathy ceaſes here without affecting the motions of the heart and arteries; but where contagious matter is ſwallowed into the ſtomach, the ſtomach after a time becomes torpid from exhauſtion of the ſenſorial power of irritation, and the heart and arteries act feebly from defect of the excitement of the power of aſſociation. In the former caſe the torpor of the ſtomach is conquered by accumulation of the power of aſſociation in one or two whole days; in the latter it recovers by accumulation of the power of irritation in three or four weeks.

In intermittent fevers the ſtomach is generally I believe affected ſecondarily by ſympathy with the torpid cutaneous capillaries, or with ſome internal torpid viſcus, and on this account an accumulation of ſenſorial power ariſes in a few hours ſufficient to reſtore the natural irritability of this organ; and hence the hot fit ſucceeds, and the fever intermits. Or if this accumulation of ſenſorial power becomes exceſſive and permanent, the continued fever with ſtrong pulſe is produced, or febris irritativa.

In continued fevers the ſtomach is frequently I ſuppoſe affected with torpor by previous exceſs of ſtimulus, and conſequent exhauſtion of ſenſorial power, as when contagious matter is ſwallowed with the ſaliva, and it is then much ſlower in producing an accumulation of ſenſorial power ſufficient to reſtore its healthy irritability; which is a frequent cauſe of continued fever with weak pulſe or febris inirritativa. Which conſiſts, after the cold fit is over, in a more frequent and more feeble action of the heart and arteries, owing to their direct ſympathy with the muſcular fibres of the torpid ſtomach; together with an increaſed action of the capillaries, glands, and abſorbents of the ſkin, and cellular membrane, owing to their reverſe ſympathy with the torpid capillaries, glands, and abſorbents of the ſtomach, or with thoſe of the heart and arteries.

Or in more accurate language. 1. The febris inirritativa, or fever with weak pulſe, commences with torpor of the ſtomach, occaſioned by previous exhauſtion of ſenſorial power of irritation by the ſtimulus of contagious matter ſwallowed with the ſaliva. 2. The whole ſyſtem becomes torpid from defect of the excitement of the ſenſorial power of aſſociation owing to the too feeble actions of the ſtomach, this is the cold fit. 3. The whole ſyſtem, except the ſtomach with the upper inteſtines, and the heart and arteries, falls into increaſed action, or orgaſm, owing to accumulation of ſenſorial power of aſſociation during their previous torpor, this is the hot fit. 4. The ſtomach and upper inteſtines have not acquired their natural quantity of ſenſorial power of irritation, which was previouſly exhauſted by violent action in conſequence of the ſtimulus of contagious matter, and the heart and arteries remain torpid from deficient excitement of the ſenſorial power of aſſociation owing to the too feeble actions of the ſtomach. 5. The accumulation of ſenſorial power of aſſociation in conſequence of the torpor of the heart and arteries occaſions a perpetual orgaſm, or increaſed action of the capillaries.

11. From hence it may be deducted firſt, that when the torpor of the ſtomach firſt occurs, either as a primary effect, or as a ſecondary link of ſome aſſociate train or circle of motions, a general torpor of the ſyſtem ſometimes accompanies it, which conſtitutes the cold fit of fever; at other times no ſuch general torpor occurs, as during the operation of a weak emetic, or during ſea-ſickneſs.

Secondly. After a time it generally happens, that a torpor of the ſtomach ceaſes, and its actions are renewed with increaſe of vigour by accumulation of ſenſorial power during its quieſcence; as after the operation of a weak emetic, or at the intervals of ſea-ſickneſs, or after the paroxyſm of an intermittent fever.

Thirdly. The ſtomach is ſometimes much ſlower in recovering from a previous torpor, and is then the remote cauſe of continued fever with weak pulſe; which is owing to a torpor of the heart and arteries, produced in conſequence of the deficient excitement of the power of aſſociation by the too weak actions of the ſtomach; and to an orgaſm of the capillaries of the other parts of the ſyſtem, in conſequence of the accumulation of ſenſorial power occaſioned by the inactivity of the heart and arteries.

Fourthly. The torpor of the ſtomach is ſometimes ſo complete, that probably the origin of its nerves is likewiſe affected, and then no accumulation of ſenſorial power occurs. In this caſe the patient dies for want of nouriſhment; either in three or four weeks, of the inirritative fever; or without quick pulſe, by what we have called pareſis irritativa. Or he continues many years in a ſtate of total debility. When this torpor ſuddenly commences, the patient generally ſuffers epileptic fits or temporary inſanity from the diſagreeable ſenſation of ſo great a torpor of the ſtomach; which alſo happens ſometimes at the eruption of the diſtinct ſmall pox; whence we have termed this diſeaſe anorexia epileptica. See Claſs II. 2. 2. 1. and III. 1. 1. 7. and Suppl. I. 14. 3.

Fifthly. When this torpor of the ſtomach is leſs in degree or extent, and yet without recovering its natural irritability by accumulation of ſenſorial power, as it does after the cold fit of intermittent fever, or after the operation of mild emetics, or during ſyncope; a permanent defect of its activity, and of that of the upper inteſtines, remains, which conſtitutes apepſia, cardialgia, hypochondriaſis, and hyſteria. See Claſs I. 3. 1. 3. and I. 2. 4. 5.

Sixthly. If the torpor of the ſtomach be induced by direct ſympathy, as in conſequence of a previous torpor of the liver, or ſpleen, or ſkin, an accumulation of ſenſorial power will ſooner be produced in the ſtomach; becauſe there has been no previous expenditure of it, the preſent torpor of the ſtomach ariſing from defect of aſſociation. Hence ſome fevers perfectly intermit, the ſtomach recovering its complete action after the torpor and conſequent orgaſm, which conſtitute the paroxyſm of fever, are terminated.

Seventhly. If the torpor of the ſtomach be owing to defect of irritation, as to the want of food, an accumulation of ſenſorial power ſoon occurs with an increaſe of digeſtion, if food be timely applied; or with violent inflammation, if food be given in too great quantity after very long abſtinence.

Eighthly. If the torpor of the ſtomach be induced by defect of pleaſurable ſenſation, as when ſickneſs is cauſed by the ſuggeſtion of nauſeous ideas; an accumulation of ſenſorial power ſoon occurs, and the ſickneſs ceaſes with the return of hunger; for in this caſe the inactivity of the ſtomach is occaſioned by the ſubduction of agreeable ſenſation, which acts as a ſubduction of ſtimulus, and not by exhauſting the natural quantity of ſenſorial power in the fibres or nerves of the ſtomach.

Ninthly. If the torpor of the ſtomach be induced by a twofold cauſe, as in ſea-ſickneſs. See Vertigo rotatoria. Claſs IV. 2. 1. 10. in which the firſt link of aſſociation acts too ſtrongly, and in conſequence expends more than uſual of the ſenſorial power of irritation; and ſecondly in which ſenſation is produced between the links of aſſociation, and diſſevers or enfeebles them; the accumulation of ſenſorial power ſoon occurs in the ſtomach; as no previous expenditure of it in that organ has occurred. Whence in ſea-ſickneſs the perſons take food with eagerneſs at times, when the vertigo ceaſes for a few minutes.

Tenthly. If the gaſtric torpor be induced by previous violent exertion, as after intoxication, or after contagious matter has been ſwallowed, or ſome poiſons, as digitalis, or arſenic; an accumulation of ſenſorial power very ſlowly ſucceeds; whence long ſickneſs, or continued fever, becauſe the quantity of ſenſorial power already waſted muſt firſt be renewed, before an accumulation of it can be produced.

12. This leads us to a ſecond indication of cure in continued fevers, which conſiſts in ſtrengthening the actions of the ſtomach; as the firſt indication conſiſted in decreaſing the actions of the cutaneous capillaries

and abſorbents. The actions of the ſtomach may ſometimes be increaſed by exhibiting a mild emetic; as an accumulation of ſenſorial power in the fibres of the ſtomach is produced during their retrograde actions. Beſides the evacuation of any noxious material from the ſtomach and duodenum, and from the aborbents, which open their mouths on their internal ſurfaces, by their retrograde motion.

It is probable, that when mild emetics are given, as ipecacuanha, or antimonium tartarizatum, or infuſion of chamomile, they are rejected by an inverted motion of the ſtomach and œſophagus in conſequence of diſagreeable ſenſation, as duſt is excluded from the eye; and theſe actions having by previous habit been found effectual, and that hence there is no exhauſtion of the ſenſorial power of irritation. But where ſtrong emetics are adminiſtered, as digitalis, or contagious matter, the previous exhauſtion of the ſenſorial power of irritation ſeems to be a cauſe of the continued retrograde actions and ſickneſs of the ſtomach. An emetic of the former kind may therefore ſtrengthen the power of the ſtomach immediately after its operation by the accumulation of ſenſorial power of irritation during its action. See Claſs IV. 1. 1.

Another method of decreaſing the action of the ſtomach for a time, and thence of increaſing it afterwards, is by the accumulation of the ſenſorial power of irritation during its torpor; as by giving ice, iced water, iced creams, or iced wine. This accounts for the pleaſure, which many people in fevers with weak pulſe expreſs on drinking cold beverage of any kind.

A ſecond method of exciting the ſtomach into action, and of decreaſing that of the capillaries in conſequence, is by the ſtimulus of wine, opium, bark, metallic ſalts of antimony, ſteel, copper, arſenic, given in ſmall repeated quantities; which ſo long as they render the pulſe ſlower are certainly of ſervice, and may be given warm or cold, as moſt agreeable to the patient. For it is poſſible, that the capillaries of the ſtomach may act too violently, and produce heat, at the ſame time that the large muſcles of it may be in a torpid ſtate; which curious circumſtance future obſervations muſt determine.

Thirdly. Hot fomentation on the region of the ſtomach might be of moſt eſſential ſervice by its ſtimulus, as heat penetrates the ſyſtem not by the abſorbent veſſels, but by external influence; whence the uſe of hot fomentation to the head in torpor of the brain; and the uſe of hot bath in caſes of general debility, which has been much too frequently neglected from a popular error occaſioned by the unmeaning application of the word relaxation to animal power. If the fluid of heat could be directed to paſs through particular parts of the body with as little diffuſion of its influence, as that of electricity in the ſhocks from the coated jar, it might be employed with ſtill greater advantage.

Fourthly. The uſe of repeated ſmall electric ſhocks through the region of the ſtomach might be of ſervice in fevers with weak pulſe, and well deſerves a trial; twenty or thirty ſmall ſhocks twice a day for a week or two would be a promiſing experiment.

Fifthly. A bliſter on the back, or ſides, or on the pit of the ſtomach, repeated in ſucceſſion, by ſtimulating the ſkin frequently ſtrengthens the action of the ſtomach by exciting the ſenſorial power of aſſociation; this eſpecially in thoſe fevers where the ſkin of the extremities, as of the hands or noſe or ears, ſooner becomes cold, when expoſed to the air, than uſual.

Sixthly. The action of the ſtomach may be increaſed by preventing too great expenditure of ſenſorial power in the link of previous motion with which it is catenated, eſpecially if the action of that link be greater than natural. Thus as the capillaries of the ſkin act too violently in fevers with weak pulſe, if theſe are expoſed to cold air or cold water, the ſenſorial power, which previouſly occaſioned their orgaſm, becomes accumulated, and tends to increaſe the action of the ſtomach; thus in thoſe fevers with weak pulſe and hot ſkin, if the ſtomach be ſtimulated by repeated ſmall doſes of bark and wine or opium, and be further excited at the ſame time by accumulation of ſenſorial power occaſioned by rendering the capillaries torpid by cold air or water, this twofold application is frequently attended with viſible good effect.

By thus ſtimulating the torpid ſtomach into greater action, the motions of the heart and arteries will likewiſe be increaſed by the greater excitement of the power of aſſociation. And the capillaries of the ſkin will ceaſe to act ſo violently, from their not poſſeſſing ſo great a ſuperfluity of ſenſorial power as during the greater quieſcence of the ſtomach and of the heart and arteries. Which is in ſome circumſtances ſimilar to the curious phenomenon mentioned in Claſs IV. 2. 2. 10; where, by covering the chill feet with flannel at the eruption of the ſmall-pox, the points of the flannel ſtimulate the ſkin of the feet into greater action, and the quantity of heat, which they poſſeſs, is alſo confined, or inſulated, and further increaſes by its ſtimulus the activity of the cutaneous veſſels of the feet; and by that circumſtance abates the too great action of the capillaries of the face, and the conſequent heat of it.

XIII. *Caſe of continued fever.*

The following caſe of continued fever which I frequently ſaw during its progreſs, as it is leſs complicate than uſual, may illuſtrate this doctrine. Maſter S. D. an active boy about eight years of age, had been much in the ſnow for many days, and ſat in the claſſical ſchool with wet feet; he had alſo about a fortnight attended a writing ſchool, where many children of the lower order were inſtructed. He was ſeized on February the 8th, 1795, with great languor, and pain in his forehead, with vomiting and perpetual ſickneſs; his pulſe weak, but not very frequent. He took an emetic, and on the next day, had a bliſter, which checked the ſickneſs only for a few hours; his ſkin became perpetually hot, and dry; and his tongue white and furred; his pulſe when aſleep about 104 in a minute, and when awake about 112.

Fourth day of the diſeaſe. He has had another bliſter, the pain of his head is gone, but the ſickneſs continues by intervals; he refuſes to take any ſolid food, and will drink nothing but milk, or milk and water, cold. He has two or three very liquid ſtools every day, which are ſometimes green, but generally of a darkiſh yellow, with great flatulency both upwards and downwards at thoſe times. An antimonial powder was once given, but inſtantly rejected; a ſpoonful of decoction of bark was alſo exhibited with the ſame event. His legs are bathed, and his hands and face are moiſtened twice a day for half an hour in warmiſh water, which is nevertheleſs much colder than his ſkin.

Eighth day. His ſkin continues hot and dry without any obſervable remiſſions, with liquid ſtools and much flatulency and ſickneſs; his water when obſerved was of a ſtraw colour. He has aſked for cyder, and drinks nearly a bottle a day mixed with cold water, and takes three drops of laudanum twice a day.

Twelfth day. He continues much the ſame, takes no milk, drinks only cyder and water, ſkin hot and dry, tongue hot and furred, with liquid ſtools, and ſickneſs always at the ſame time; ſleeps much.

Sixteenth day. Was apparently more torpid, and once rather delirious; pulſe 112. Takes only capillaire and water; ſleeps much.

Twentieth day. Pulſe 100, ſkin dry but leſs hot, liquid ſtools not ſo frequent, he is emaciated to a great degree, he has eaten half a tea-cup full of cuſtard to day, drinks only capillaire and water, has thrice taken two large ſpoonfuls of decoction of bark with three drops of laudanum, refuſes to have his legs bathed, and will now take nothing but three drops of laudanum twice a day.

Twenty-fourth day. He has gradually taken more cuſtard every day, and began to attend to ſome new play things, and takes wine ſyllabub.

Twenty-eighth day. He daily grows ſtronger, eats eggs, and bread and butter, and ſleeps immediately after his food, can creep on his hands and knees, but cannot ſtand erect.

Thirty-ſecond day. He cannot yet ſtand alone ſafely, but ſeems hourly to improve in ſtrength of body, and activity of mind.

In this caſe the remote cauſe of his fever could not be well aſcertained, as it might be from having his feet cold for many ſucceſſive days, or from contagion; but the latter ſeems more probable, becauſe his younger brother became ill of a ſimilar fever about three weeks afterwards, and probably received the infection from him. The diſeaſe commenced with great torpor of the ſtomach, which was ſhewn by his total averſion to ſolid food, and perpetual ſickneſs; the watery ſtools, which were ſometimes green, or of a darkiſh yellow, were owing to the acrimony, or acidity, of the contents of the bowels; which as well as the flatulency were occaſioned by indigeſtion. This torpor of the ſtomach continued throughout the whole fever, and when it ceaſed, the fever ceaſed along with it.

The contagious material of this fever I ſuppoſe to have been mixed with the ſaliva, and ſwallowed into the ſtomach; that it excited the veſſels, which conſtitute the ſtomach, into the greateſt irritative motion like arſenic; *which might not be perceived, and yet might render that organ paralytic or inirritable in a moment of time;* as animals ſometimes die by one ſingle exertion, and conſequent paralyſis, without a ſecond ſtruggle; as by lightning, or being ſhot through the back part of the brain; of both which I have ſeen inſtances. I had once an opportunity of inſpecting two oxen, a few minutes after they were killed by lightning under a crab-tree on moiſt ground in long graſs; and obſerved, that they could not have ſtruggled, as the graſs was not preſſed or bent near them; I have alſo ſeen two horſes ſhot through the cerebellum, who never once drew in their legs after they firſt ſtretched them out, but died inſtantaneouſly; in a ſimilar manner the lungs ſeem to be rendered inſtantly inanimate by the fumes of burning ſulphur.

The lungs may be ſometimes primarily affected with contagious matter floating in the atmoſphere as well as the ſtomach, as mentioned in article 9. of this Supplement. But probably this may occur much leſs frequently, becauſe the oxygen of the atmoſphere does not appear to be taken into the blood by animal abſorption, as the ſaliva in the ſtomach, but paſſes through the moiſt membranes into the blood, like the ethereal fluids of electricity or heat, or by chemical attraction, and in conſequence the contagious matter may be left behind; except it may ſometimes be abſorbed along with the mucus; of which however in this caſe there appeared no ſymptoms.

The tonſils are other organs liable to receive contagious matter, as in the ſmall-pox, ſcarlet-fever, and in other ſenſitive inirritated fevers; but no ſymptom of this appeared here, as the tonſils were at no time of the fever inflamed, though they were in this child previouſly uncommonly large.

The pain of the forehead does not ſeem to have been of the internal parts of the head, becauſe the nerves, which ſerve the ſtomach, are not derived from the anterior part of the brain; but it ſeems to have been owing to a torpor of the external membranes about the forehead from their direct ſympathy with thoſe of the ſtomach; that is, from the deficient excitement of the ſenſorial power of aſſociation; and ſeemed in ſome meaſure to be relieved by the emetics and bliſters.

The pulſations of the heart were weaker and in conſequence quicker than natural, owing to their direct ſympathy with the torpid periſtaltic motions of the ſtomach; that is to the deficient excitement of the ſenſorial power of aſſociation.

The action of the cutaneous capillaries and abſorbents were ſtronger than natural, as appeared by the perpetual heat and dryneſs of the ſkin; which was owing to their reverſe ſympathy with the heart and arteries. This weaker and quicker action of the heart and arteries, and the ſtronger action of the cutaneous capillaries and abſorbents, continued throughout the diſeaſe, and may be ſaid to have conſtituted the fever, of which the torpor of the ſtomach was the remote cauſe.

His tongue was not very much furred or very dry, nor his breath very hot; which ſhewed, that there was no great increaſe of the action of the mucous abſorbents, nor of the pulmonary capillaries, and yet ſufficient to produce great emaciation. His urine was nearly natural both in quantity and colour; which ſhewed, that there was no increaſe of action either of the kidneys, or of the urinary abſorbents.

The bathing his legs and hands and face for half an hour twice a day ſeemed to refreſh him, and ſometimes made his pulſe ſlower, and thence I ſuppoſe ſtronger. This ſeems to have been cauſed by the water, though ſubtepid, being much below the heat of his ſkin, and conſequently contributing to cool the capillaries, and by ſatiating the abſorbents to relieve the uneaſy ſenſation from the dryneſs of the ſkin.

He continued the uſe of three drops of tincture of opium from about the eighth day to the twenty-fourth, and for the three preceding days took along with it two large ſpoonfuls of an infuſion of bark in equal parts of wine and water. The former of theſe by its ſtimulus ſeemed to decreaſe his languor for a time, and the latter to ſtrengthen his returning power of digeſtion.

The daily exacerbations or remiſſions were obſcure, and not well attended to; but he appeared to be worſe on the fourteenth or fifteenth days, as his pulſe was then quickeſt, and his inattention greateſt; and he began to get better on the twentieth and twenty-firſt days of his diſeaſe; for the pulſe then became leſs frequent, and his ſkin cooler, and he took rather more food: theſe circumſtances ſeemed to obſerve the quarter periods of lunation.

XIV. *Termination of continued fever.*

1. When the ſtomach is primarily affected with torpor not by defect of ſtimulus, but in conſequence of the previous exhauſtion of its ſenſorial power; and not ſecondarily by its aſſociation with other torpid parts; it ſeems to be the general cauſe of the weak pulſations of the heart and arteries, and the conſequent increaſed action of the capillaries, which conſtitute continued fever with weak pulſe. In this ſituation if the patient recovers, it is owing to the renovation of life in the torpid ſtomach, as happens to the whole ſyſtem in winter-ſleeping animals. If he periſhes, it is owing to the exhauſtion of the body for want of nouriſhment occaſioned by indigeſtion; which is haſtened by the increaſed actions of the capillaries and abſorbents.

2. When

2. When the ſtomach is primarily affected by defect of ſtimulus, as by cold or hunger; or ſecondarily by defect of the power of aſſociation, as in intermittent fevers; or laſtly in conſequence of the introduction of the ſenſorial power of ſenſation, as in inflammatory diſeaſes; the actions of the heart and arteries are not diminiſhed, as when the ſtomach is primarily affected with torpor by its previous exhauſtion of ſenſorial power, but become greatly increaſed, producing irritative or inflammatory fever. Where this fever is continued, though with ſome remiſſions and exacerbations, the exceſſive action is at length ſo much leſſened by expenditure of ſenſorial power, as to gradually terminate in health; or it becomes totally exhauſted, and death ſucceeds the deſtruction of the irritability and aſſociability of the ſyſtem.

3. There is alſo another termination of the diſeaſes in conſequence of great torpor of the ſtomach, which are not always termed fevers; one of theſe is attended with ſo great and univerſal torpor, that the patient dies in the firſt cold fit; that is, within twelve hours or leſs of the firſt ſeizure; this is commonly termed ſudden death. But the quickneſs of the pulſe, and the coldneſs with ſhuddering, and with ſick ſtomach, diſtinguiſhed a caſe, which I lately ſaw, from the ſudden deaths occaſioned by apoplexy, or ruptured bloodveſſels.

In hemicrania I believe the ſtomach is always affected ſecondarily, as no quickneſs of pulſe generally attends it, and as the ſtomach recovers its activity in about two whole days. But in the following caſe, which I ſaw laſt week, I ſuppoſe the ſtomach ſuddenly became paralytic, and cauſed in about a week the death of the patient. Miſs ———, a fine young lady about nineteen, had bathed a few times, about a month before, in a cold ſpring, and was always much indiſpoſed after it; ſhe was ſeized with ſickneſs, and cold ſhuddering, with very quick pulſe, which was ſucceeded by a violent hot fit; during the next cold paroxyſm ſhe had a convulſion fit; and after that ſymptoms of inſanity, ſo as to ſtrike and bite the attendants, and to ſpeak furious language; the ſame circumſtances occurred during a third fit, in which I believe a ſtrait waiſtcoat was put on, and ſome blood taken from her; during all this time her ſtomach would receive no nutriment, except once or twice a little wine and water. On the ſeventh day of the diſeaſe, when I ſaw her, the extremities were cold, the pulſe not to be counted, and ſhe was unable to ſwallow, or to ſpeak; a clyſter was uſed with turpentine and muſk and opium, with warm fomentations, but ſhe did not recover from that cold fit.

In this caſe the convulſion fit and the inſanity ſeem to have been violent efforts to relieve the diſagreeable ſenſation of the paralytic ſtomach; and the quick pulſe, and returning fits of torpor and of orgaſm, evinced the diſeaſe to be attended with fever, though it might have been called anorexia maniacalis, or epileptica.

4. Might not many be ſaved in theſe fevers with weak pulſe for a few weeks by the introduction of blood into a vein, once in two or three days; which might thus give further time for the recovery of the torpid ſtomach? Which ſeems to require ſome weeks to acquire its former habits of action, like the muſcles of paralytic patients, who have all their habits of voluntary aſſociations to form afreſh, as in infancy.

If this experiment be again tried on the human ſubject, it ſhould be ſo contrived, that the blood in paſſing from the well perſon to the ſick one ſhould not be expoſed to the air; it ſhould not be cooled or heated; and it ſhould be meaſured; all which may be done in the following manner. Procure two ſilver pipes, each about an inch long, in the form of funnels, wide at top, with a tail beneath, the former ſomething wider than a ſwan-quill, and the latter leſs than a ſmall crow-quill. Fix one of theſe ſilver funnels by its wide end to one end of the gut of a chicken freſh killed about four or ſix inches long, and the other to the other end of the gut; then introduce the ſmall end of one funnel into the vein of the arm of a well perſon downwards towards the hand; and laying the gut with the other end on a water-plate heated to 98 degrees in a very warm room, let the blood run through it. Then preſſing the finger on the gut near the arm of the well perſon, ſlide it along ſo as to preſs out one gutful into a cup, in order to aſcertain the quantity by weight. Then introduce the other end of the other funnel into a ſimilar vein in the arm of the ſick perſon upwards towards the ſhoulder; and by ſliding one finger, and then another reciprocally, along the chicken's gut, ſo as to compreſs it, from the arm of the well perſon to the arm of the ſick one, the blood may be meaſured, and thus the exact quantity known which is given and received. See Claſs I. 2. 3. 25.

XV. *Inflammation excited in fever.*

1. When the actions of any part of the ſyſtem of capillaries are excited to a certain degree, ſenſation is produced, along with a greater quantity of heat, as mentioned in the fifth article of this ſupplement. When this increaſed capillary action becomes ſtill more energetic, by the combined ſenſorial powers of ſenſation with irritation, new fibres are ſecreted, or new fluids, (which harden into fibres like the mucus ſecreted by the ſilk-worm, or ſpider, or pinna,) from which new veſſels are conſtructed; it is then termed inflammation: if this exiſts in the capillary veſſels of the cellular membrane or ſkin only, with feeble pulſations of the heart and arteries, the febris ſenſitiva inirritata, or malignant fever, occurs; if the coats of the arteries are alſo inflamed, the febris ſenſitiva irritata, or inflammatory fever, exiſts.

In all theſe fevers the part inflamed is called a phlegmon, and by its violent actions excites ſo much pain, that is, ſo much of the ſenſorial power of ſenſation, as to produce more violent actions, and inflammation, throughout the whole ſyſtem. Whence great heat from the excited capillaries of the ſkin, large and quick pulſations of the heart, full and hard arteries, with great univerſal ſecretions and abſorptions. Theſe perpetually continue, though with exacerbations and remiſſions; which ſeem to be governed by ſolar or lunar influence.

2. In this ſituation there generally, I ſuppoſe, exiſts an increaſed activity of the ſecerning veſſels of the brain, and conſequently an increaſed production of ſenſorial power; in leſs violent quantity of this diſeaſe however the increaſe of the action of the heart and arteries may be owing ſimply to the accumulation of ſenſorial power of aſſociation in the ſtomach, when that organ is affected by ſympathy with ſome inflamed part. In the ſame manner as the capillaries are violently and permanently actuated by the accumulation of the ſenſorial power of aſſociation in the heart and arteries, when the ſtomach is affected primarily by contagious matter, and the heart and arteries ſecondarily. Thus I ſuſpect, that in the diſtinct ſmall-pox the ſtomach is affected ſecondarily by ſympathy with the infected tonſils or inoculated arm; but that in the confluent ſmall-pox the ſtomach is affected primarily, as well as the tonſils, by contagious matter mixed with the ſaliva, and ſwallowed.

3. In inflammatory fevers with great arterial action, as the ſtomach is not always affected with torpor, and as there is a direct ſympathy between the ſtomach and heart, ſome people have believed, that nauſeating

doſes of ſome emetic drug, as of antimonium tartariſatum, have been adminiſtered with advantage, abating by direct ſympathy the actions of the heart. This theory is not ill founded, and the uſe of digitalis, given in ſmall doſes, as from half a dram to a dram of the ſaturated tincture, two or three times a day, as well as other leſs violent emetic drugs, would be worth the attention of hoſpital phyſicians.

Sickneſs might alſo be produced probably with advantage by whirling the patient in a chair ſuſpended from the cieling by two parallel cords; which after being revolved fifty or one hundred times in one direction, would return with great circular velocity, and produce vertigo, ſimilar I ſuppoſe to ſea-ſickneſs. And laſtly the ſickneſs produced by reſpiring an atmoſphere mixed with one tenth of carbonated hydrogen, diſcovered by Mr. Watt, and publiſhed by Dr. Beddoes, would be well worthy exact and repeated experiment.

4. Cool air, cool fomentations, or ablutions, are alſo uſeful in this inflammatory fever; as by cooling the particles of blood in the cutaneous and pulmonary veſſels, they muſt return to the heart with leſs ſtimulus, than when they are heated above the natural degree of ninety-eight. For this purpoſe ſnow and ice have been ſcattered on the patients in Italy; and cold bathing has been uſed at the eruption of the ſmall pox in China, and both, it is ſaid, with advantage. See Claſs III. 3. 1, 12. and Suppl. I. 8.

5. The lancet however with repeated mild cathartics is the great agent in deſtroying this enormous excitement of the ſyſtem, ſo long as the ſtrength of the patient will admit of evacuations. Bliſters over the painful part, where the phlegmon or topical inflammation is ſituated, after great evacuation, is of evident ſervice, as in pleuriſy. Warm bathing for half an hour twice a day, when the patient becomes enfeebled, is of great benefit, as in peripneumony and rheumatiſm.

6. When other means fail of ſucceſs in abating the violent excitement of the ſyſtem in inflammatory diſeaſes, might not the ſhaved head be covered with large bladders of cold water, in which ice or ſalt had been recently diſſolved; and changed as often as neceſſary, till the brain is rendered in ſome degree torpid by cold?—Might not a greater degree of cold, as iced water, or ſnow, be applied to the cutaneous capillaries?

7. Another experiment I have frequently wiſhed to try, which cannot be done in private practice, and which I therefore recommend to ſome hoſpital phyſician; and that is, to endeavour to ſtill the violent actions of the heart and arteries, after due evacuations by veneſection and cathartics, by gently compreſſing the brain. This might be done by ſuſpending a bed, ſo as to whirl the patient round with his head moſt diſtant from the centre of motion, as if he lay acroſs a mill-ſtone, as deſcribed in Sect. XVIII. 20.

For

For this purpoſe a perpendicular ſhaft armed with iron gudgeons might have one end paſs into the floor, and the other into a beam in the cieling, with an horizontal arm, to which a ſmall bed might be readily ſuſpended.

By thus whirling the patient with increaſing velocity ſleep might be produced, and probably the violence of the actions of the heart and arteries might be diminiſhed in inflammatory fevers; and, as it is believed, that no accumulation of ſenſorial power would ſucceed a torpor of the origin of the nerves, either thus procured by mechanical compreſſion, or by the bladder-cap of cold water above deſcribed, the lives of thouſands might probably be ſaved by thus extinguiſhing the exacerbations of febrile paroxyſms, or preventing the returns of them.

In fevers with weak pulſe, ſleep, or a degree of ſtupor, thus produced, might prevent the too great expenditure of ſenſorial power, and thus contribute to preſerve the patient. See Claſs I. 2. 5. 10. on ſtupor. What might be the conſequence of whirling a perſon with his head next the centre of motion, ſo as to force the blood from the brain into the other parts of the body, might be diſcovered by cautious experiment without danger, and might probably add to our ability of curing fever.

XVI. *Recapitulation.*

1. The ſenſorial power cauſes the contraction of the fibres, and is excited into action by four different circumſtances, by the ſtimulus of external bodies, by

pain or pleaſure, by deſire or averſion, or by the previous, motions of other contracting fibres. In the firſt ſituation it is called the ſenſorial power of irritation, in the ſecond the ſenſorial power of ſenſation, in the third the ſenſorial power of volition, and in the fourth the ſenſorial power of aſſociatiation.

Many parts of the body are excited into perpetual action, as the ſanguiferous veſſels conſiſting of the heart, arteries, and veins; others into nearly perpetual action, as the conglomerate and capillary glands; and others into actions ſtill ſomewhat leſs frequent, as the alimentary canal, and the lacteal and lymphatic abſorbents with their conglobate glands: all theſe are principally actuated by the ſenſorial powers of irritation, and of aſſociation; but in ſome degree or at ſome times by thoſe of ſenſation, and even of volition. There are three kinds of ſtimulus, which may eaſily be occaſionally diminiſhed, that of heat on the ſkin, of food in the ſtomach, and of the oxygenous part of the atmoſphere, which mixes with the blood in reſpiration, and ſtimulates the heart and arteries.

2. When any parts, which are naturally excited into perpetual action by ſtimulus, become torpid or leſs active from decreaſe of that ſtimulus; there firſt occurs a decreaſe of the activity of the parts next catenated with them; thus going into cold water produces a torpor of the capillary veſſels of the lungs, as is known by the difficult reſpiration, which immediately occurs; for the ſenſorial power of aſſociation, which

naturally contributes to actuate the lungs, is now leſs excited by the decreaſed actions of the cutaneous veſſels, with which they are catenated. This conſtitutes the cold fit of fever.

There next occurs an accumulation of the ſenſorial power of irritation in the parts, which were torpid from defect of ſtimulus, as the cutaneous veſſels for inſtance when expoſed to cold air; and a ſimilar accumulation of the ſenſorial power of aſſociation occurs in the parts which were catenated with the former, as the veſſels of the lungs in the example above mentioned. Whence, if the ſubduction of ſtimulus has not been too great, ſo as to impair the health of the part, the activity of the irritative motions returns, even though the ſtimulus continues leſs than uſual; and thoſe of the aſſociate motions become conſiderably increaſed, becauſe theſe latter are now excited by the previous fibrous motions, which now act as ſtrong or ſtronger than formerly, and have alſo acquired an accumulation of the ſenſorial power of aſſociation. This accounts for the curious event of our becoming warm in a minute or two after remaining in water of about 80 degrees of heat, as in the bath at Buxton; or in the cold air of a froſty morning of about 30 degrees of heat.

But if the parts thus poſſeſſed of the accumulated ſenſorial powers of irritation and of aſſociation be expoſed again to their natural quantity of ſtimulus, a great exceſs of activity ſupervenes; becauſe the fibres, which poſſeſs accumulated irritation, are now excited by their uſual quantity of ſtimulus; and thoſe which poſſeſs accumulated aſſociation, are now excited by double or treble the quantity of the preceding irritative fibrous motions, with which they are catenated; this conſtitutes the hot fit of fever.

Another important circumſtance occurs, when the parts, which are torpid from decreaſed ſtimulus, do not accumulate a quantity of ſenſorial power ſufficient for the purpoſe of renewing their own natural quantity of action; but are nevertheleſs not ſo torpid, as to have the life of the part impaired. In this ſituation the ſuperabundance of the accumulated power of irritation contributes to actuate the aſſociate motions next catenated with them. Thus, when a perſon breathes air with leſs oxygene than natural, as by covering his head in bed, and thus reſpiring the ſame atmoſphere repeatedly, the heart and arteries become leſs active by defect of the ſtimulus of oxygene; and then the accumulation of ſenſorial power of irritation becomes inſtantly very great, as theſe organs are ſubject to perpetual and energetic action. This accumulation nevertheleſs is not ſo great as to renew their own activity under this defect of ſtimulus, but yet is in ſufficient abundance to increaſe the aſſociability of the next link of catenation, that is, to actuate the capillaries of the ſkin with great and perpetual increaſe of energy. This reſembles continued fever with weak pulſe; in which the accumulation of the ſenſorial power cauſed by the leſſened motions of the heart and arteries, actuates the capillaries with increaſe of energy.

3. When the accumulation of the ſenſorial power of aſſociation, which is cauſed as above explained by deficient excitement owing to the leſſened quantity of action of the irritative fibrous motions, with which the aſſociate train is catenated, is not in quantity ſufficient to renew the natural actions of the firſt link of an aſſociate train of motions; it is nevertheleſs frequently ſo abundant as to actuate the next link of the aſſociated train with unnatural energy by increaſing its aſſociability; and that in a ſtill greater degree if that ſecond link of the aſſociated train was previouſly in a torpid ſtate, that is, had previouſly acquired ſome accumulation of the ſenſorial power of aſſociation. This important circumſtance of the animal economy is worthy our moſt accurate attention. Thus if the heart and arteries are deprived of their due quantity of the ſtimulus of oxygene in the blood, a weak and quick pulſe enſues, with an accumulation of the ſenſorial power of irritation; next follows an increaſe of the action of the capillaries by the ſuperabundance of this accumulated power of irritation; but there alſo exiſts an accumulation of the power of aſſociation in theſe acting capillaries, which is not now excited by the deficient actions of the heart and arteries; but which by its abundance contributes to actuate the next link of aſſociation, which is the ſick ſtomach in the caſe related from Sydenham in Claſs IV. 1. 1. 2. and explained in this Supplement I. 4. And as this ſick ſtomach was in a previous ſtate of torpor, it might at the ſame time poſſeſs an accumulation of ſome ſenſorial

power, which, if it was of aſſociation, would be thus more powerfully excited by the increaſed actions of the capillaries; which exiſted in conſequence of the weak action of the heart and arteries. This alſo reſembles in ſome reſpects the continued fevers with weak pulſe, and with increaſed activity of the capillaries.

4. When a torpor of ſome irritative motions occurs from a previous exhauſtion of the ſenſorial power of irritation by the action of ſome very great ſtimulus, it is long before any accumulation of the ſenſorial power of irritation is produced; as is experienced in the ſickneſs and languor, which continues a whole day after a fit of drunkenneſs. But nevertheleſs there occurs an accumulation of the ſenſorial power of aſſociation in the firſt link of the aſſociate train of motions, which is catenated with theſe torpid irritative ones; which accumulation is owing to deficient excitement of that ſenſorial power in the firſt link of the aſſociate train. This firſt link therefore exiſts alſo in a leſs active or torpid ſtate, but the accumulation of the ſenſorial power of aſſociation by its ſuperabundance contributes to actuate the ſecond link of the aſſociate train with unnatural quantity of motion; and that though its own natural quantity of the power of aſſociation is not excited by the deficient action of preceding fibrous motions.

When this happens to the ſtomach, as after its irritative motions have been much exerted from the unnatural

natural ſtimulus of wine, or opium, or of contagious matter mixed with the ſaliva, a torpor or inactivity of it ſucceeds for a greater or leſs length of time; as no accumulation of the ſenſorial power of irritation can occur, till the natural quantity, which has been previouſly expended, is firſt reſtored. Then the heart and arteries, which are next in catenation, become leſs active from the want of ſufficient excitement of the ſenſorial power of aſſociation, which previouſly contributed to actuate them. This ſenſorial power of aſſociation therefore becomes accumulated, and by its ſuperabundance contributes to actuate the link next in aſſociation, which has thus acquired ſo great a degree of aſſociability, as to overbalance the leſs quantity of the excitement of it by the torpid action of the previous or firſt aſſociate link. This happens to the capillaries, when the heart and arteries are affected as above by the torpor of the ſtomach, when it is occaſioned by previous great expenditure of its ſenſorial power, and thus conſtitutes fever with weak pulſe, which is here termed inirritative fever, typhus mitior.

5. When a deficiency of ſtimulus is too great or too long continued, ſo as to impair the life of the part, no further accumulation of ſenſorial power occurs; as when the ſkin is long expoſed to cold and damp air. In that caſe the link in catenation, that is, the firſt of the aſſociate train, is rendered torpid by defect of excitement of its uſual quantity of the ſenſorial power of aſſociation, and from there being no accumulation of

the ſenſorial power of irritation to increaſe its aſſociability, and thus to contribute to actuate it by overbalancing the defect of the excitement of its aſſociation.

Thus on riding long and ſlowly on a cold and damp day, the exhalation of the vapour, which is impinged on the ſkin, as the traveller proceeds, carries away his warmth faſter, than it is generated within the ſyſtem; and thus the capillaries of the ſkin have their actions ſo much impaired after a time, that no accumulation of the ſenſorial power of irritation occurs; and then the ſtomach, whoſe motions are catenated with thoſe of the capillaries, ceaſes to act from the deficient excitement of the power of aſſociation; and indigeſtion and flatulency ſucceed, inſtead of the increaſed digeſtion and hunger, which occur, when the cutaneous capillaries are expoſed to a leſs degree of cold, and for a ſhorter time. In which latter ſituation the accumulation of the ſenſorial power of irritation increaſes by its ſuperabundance the aſſociability of the fibres of the ſtomach, ſo as to overbalance the defect of the excitement of their aſſociation.

6. The ſtomach is affected ſecondarily in fevers with ſtrong pulſe, as in thoſe with weak pulſe it is affected primarily. To illuſtrate this doctrine I ſhall relate the following caſe of Mr. Y———. He was a young man rather intemperate in the uſe of wine or beer, and was ſeized with a cold fit, and with a conſequent hot one with ſtrong pulſe; on examining his hypo-

chondrium an oblong tumour was diſtinctly felt on the left ſide of the ſtomach, which extended ſix or eight inches downward, and was believed to be a tumour of the ſpleen, which thus occaſioned by its torpor the cold fit and conſequent hot fit of fever with ſtrong pulſe. This fever continued, though with remiſſions, for two or three weeks; and the patient repeatedly loſt blood, uſed cathartics with calomel and ſenna, and had frequent antimonial and ſaline medicines. And after he was much weakened by evacuations, the Peruvian bark and ſmall doſes of ſteel removed the fever, but the tumour remained many years during the remainder of his life.

In this caſe the tumour of the ſpleen was occaſioned by the torpor of the abſorbent veſſels; while the ſecerning veſſels continued ſomewhat longer to pour their fluids into the cells of it. Then the inactivity of this viſcus affected the whole ſyſtem with torpor by the deficient excitement of the ſenſorial power of aſſociation, which contributes along with the irritation cauſed by their ſpecific ſtimuli to actuate the whole ſanguiferous, ſecerning, and abſorbent veſſels; and along with theſe the ſtomach, which poſſeſſes perhaps greater mobility, or promptitude to torpor or to orgaſm, than any other part. And after a time all theſe parts recover their actions by the accumulation of their ſenſorial power of aſſociation. But the ſpleen not recovering its action from the accumulation of its power of irritation, as appeared from the continuance of the tumour, ſtill affects the ſtomach by its defective irritative motions ceaſing to excite the aſſociation, which ought to contribute to actuate it.

Hence the ſtomach continues torpid in reſpect to its motions, but accumulates its power of aſſociation; which is not excited into action by the defective motions of the ſpleen; this accumulation of the ſenſorial power of aſſociation now by its ſuperabundance actuates the next link of aſſociate motions, which conſiſts of the heart and arteries, into greater energy of action than natural, and thus cauſes fever with ſtrong pulſe; which, as it was ſuppoſed to be moſt frequently excited by increaſe of irritation, is called irritative fever or ſynocha.

Similar to this in the ſmall-pox, which is given by inoculation, the ſtomach is affected ſecondarily, when the fever commences; and hence in this ſmall-pox the pulſations of the heart and arteries are frequently ſtronger than natural, but never weaker, for the reaſons above given. Whereas in that ſmall-pox, which is cauſed by the ſtomach being primarily affected, by the contagious matter being ſwallowed with the ſaliva, whether the tonſils are at the ſame time affected or not, the pulſations of the heart and arteries become weak, and the inirritative fever is produced, as explained above, along with the confluent ſmall-pox. This unfolds the cauſe of the mildneſs of the inoculated ſmall-pox; becauſe in this diſeaſe the ſtomach is affected ſecondarily, whereas in the natural ſmall-pox it is frequently affected primarily by ſwallowing the contagious matter mixed with ſaliva.

In the meaſles I ſuppoſe the contagious matter to be diſſolved in the air, and therefore not liable to be mixed with the ſaliva; whereas the variolous matter is probably only diffuſed in the air, and thence more readily mixed with the ſaliva in the mouth during reſpiration. This difference appears more probable, as the ſmall-pox I believe is always taken at a leſs diſtance from the diſeaſed perſon than is neceſſary to acquire the meaſles. The contagion of the meaſles affects the membranes of the noſtrils, and the ſecretion of tears in conſequence, but never I ſuſpect the ſtomach primarily, but always ſecondarily; whence the pulſation of the heart and arteries is always ſtronger than natural, ſo as to bear the lancet at any period of the diſeaſe.

The great mildneſs ſometimes, and fatality at other times, of the ſcarlet fever may depend on the ſame circumſtance; that is, on the ſtomach being primarily or ſecondarily affected by the contagious matter, obſerving that the tonſils may be affected at the ſame time with the ſtomach. Should this prove to be the caſe, which future obſervations muſt determine, what certain advantage muſt ariſe from the inoculation of this diſeaſe! When it is received by the ſkin primarily I ſuppoſe no ſore throat attends it, nor fever with weak pulſe; when it is received by the ſtomach primarily, the tonſils are affected at the ſame time, and the torpor of the ſtomach produces inirritative fever, and the mortification of the tonſils ſucceeds.

We may hence conclude, that when the torpor of the ſtomach is either owing to defect of ſtimulus, which is not ſo great as to impair the life of the part, as in moderate hunger, or in ſwallowing iced water; or when its torpor is induced by its catenation or aſſociation with other torpid parts, as in the commencement of intermittent fevers, and inoculated ſmall-pox, that the ſubſequent action of the heart and arteries is generally increaſed, producing irritative fever. Which is owing to the accumulation of the ſenſorial power of irritation in one caſe, and of aſſociation in the other, contributing to actuate the next link of the catenated or aſſociated motions. But when the torpor of the ſtomach is induced by previous exhauſtion of its ſenſorial powers of irritation or of aſſociation by continued violent action, as by the ſtimulus of digitalis, or of contagious matter, or after intoxication from wine or opium, a weaker action of the heart and arteries ſucceeds, becauſe there is no accumulation of ſenſorial power, and a deficient excitement of aſſociation. And finally, as this weak action of the heart and arteries is not induced by exhauſtion of ſenſorial power, but by defect of the excitement of aſſociation, the accumulation of this power of aſſociation increaſes the action of the capillaries, and thus induces irritative fever.

7. When any part of the ſyſtem acts very violently in fevers, the ſenſorial power of ſenſation is excited, which increaſes the actions of the moving ſyſtem;

whereas the pain, which ariſes from decreaſed irritative motions, as in hemicrania, ſeems to exhauſt a quantity of ſenſorial power, without producing or increaſing any fibrous actions.

When the ſtomach is primarily affected, as in inirritative fevers from contagion, and in ſuch a manner as to occaſion pain, the action of the capillaries ſeems to be increaſed by this additional ſenſorial power of ſenſation, whence extenſive inflammation or mortification; but when the ſtomach and conſequently the heart and arteries continue their torpidity of action; as in confluent ſmall-pox, and fatal ſcarlatina; this conſtitutes ſenſitive inirritative fever, or typhus gravior.

But when the ſtomach is ſecondarily affected, if the ſenſorial power of ſenſation is excited, as in pleuriſy or peripneumony, the actions of the heart and arteries, are violently increaſed, and of all the moving ſyſtem along with them. Thus the peripneumony is generally induced by the patient reſpiring very cold air, and this eſpecially after being long confined to warm air, or after being much fatigued and heated by exceſſive labour or exerciſe. For we can cover the ſkin with more clothes, when we feel ourſelves cold; but the lungs not having the perception of cold, we do not think of covering them, nor have the power to cover them, if we deſired it; and the torpor, thus produced is greater, or of longer duration, in proportion to the previous expenditure of ſenſorial power by heat or exerciſe.

This torpor of the lungs affects the ſkin with ſhuddering, and the ſtomach is alſo ſecondarily affected; next follows the violent action of the lungs from the accumulation of the power of irritation, and an inflammation of them follows this violent action. While the ſtomach recovers its activity by the increaſe of the excitement of the ſenſorial power of aſſociation, and along with it the heart and arteries, and the whole moving ſyſtem. Hence this inflammation occurs during the hot fit of fever, and no cold fit ſucceeds, becauſe the exceſs of the ſenſorial power of ſenſation prevents a ſucceeding torpor.

Theſe new motions of certain parts of the ſyſtem produce increaſed ſecretions of nutritious or organic mucus, which forms new veſſels; theſe new veſſels by their unuſual motions produce new kinds of fluids; which are termed contagious, becauſe they have the power, when introduced into a healthy body, of producing ſimilar actions and effects, with or without fever, as in the ſmall-pox and meaſles, or in the itch and venereal diſeaſe.

If any of theſe contagious matters affect the ſtomach with torpor either by their ſtimulus immediately applied, or by its ſympathy with the parts firſt diſeaſed, a fever is produced with ſickneſs and want of appetite; as in ſmall-pox, and ſcarlatina. If the ſtomach is not affected by contagious matter, no fever ſucceeds, as in itch, tinea, ſyphilis.

All theſe contagious matters are conceived to be harmleſs, till they have been expoſed to the air, either openly or through a moiſt membrane; from which they are believed to acquire oxygene, and thence to become ſome kind of animal acids. As the preparations of mercury cure venereal ulcers; as a quarter of a grain of ſublimate diſſolved in wine, and given thrice a day; this effect ſeems to be produced either by its ſtimulating the abſorbents in the ulcer to abſorb the venereal matter before it has acquired oxygen; or by afterwards uniting with it chemically, and again depriving it of its acquired acidity. On either ſuppoſition it might probably be given with advantage in ſmall-pox, and in all infectious diſeaſes, both previous to their commencement, and during their whole progreſs.

8. The cold fits of intermittent fevers are cauſed by the torpor of ſome part owing to deficient irritation, and of the other parts of the ſyſtem from deficient aſſociation. The hot fits are owing firſt to the accumulation of irritation in the part primarily affected, if it recovers its action, which does not always happen; and ſecondly to the accumulation of aſſociation in the other parts of the ſyſtem, which during health are ſubject to perpetual action; and laſtly alſo to the greater excitement of the power of aſſociation, when the part primarily affected recovers its irritability, and acts with greater energy than natural.

The deficient ſecretions in the cold fit depend on the torpor of the glandular ſyſtem; and the increaſed ſecretions in the hot fit on their more energetic action.

The thirſt in the cold fit is owing to the deficient abſorption from the ſkin, cellular membrane, and bladder; the thirſt in the hot fit is owing to the too great diſſipation of the aqueous part of the blood. The urine is pale and in ſmall quantity in the cold fit from deficient ſecretion of it, and from deficient abſorption of its aqueous parts; it is high coloured, and ſometimes depoſits a ſediment, in the hot fit from the greater ſecretion of it in the kidneys, and the greater abſorption of its aqueous and ſaline part in the bladder. The dryneſs and ſcurf on the tongue and noſtrils is owing to the increaſed heat of the air expired from the lungs, and conſequent greater evaporation of the aqueous part of the mucus. The ſweats appear in conſequence of the declenſion of the hot fit, owing to the abſorbent veſſels of the ſkin loſing their increaſed action ſooner than the ſecerning ones; and to the evaporation leſſening as the ſkin becomes cooler. The returns of the paroxyſms are principally owing to the torpor of ſome leſs eſſential part of the ſyſtem remaining after the termination of the laſt fit; and are alſo dependent on ſolar or lunar diurnal periods.

The torpor of the part, which induces the cold paroxyſm, is owing to deficient irritation occaſioned either by the ſubduction of the natural ſtimuli of food, or water, or pure air, or by deficiency of external influences, as of heat, or of ſolar or lunar gravitation. Or ſecondly, in conſequence of the exhauſtion of ſenſorial power by great previous exertions of ſome parts of the ſyſtem, as of the limbs by great labour or exerciſe, or of the ſtomach by great ſtimulus, as by contagious matter ſwallowed with the ſaliva, or by much wine or opium previouſly taken into it. Or laſtly a torpor of a part may be occaſioned by ſome mechanic injury, as by a compreſſion of the nerves of the part, or of their origin in the brain; as the ſitting long with one leg croſſed over the other occaſions numbneſs, and as a torpor of the ſtomach with vomiting frequently precedes paralytic ſtrokes of the limbs.

As ſleep is produced, either by defect of ſtimulus, or by previous exhauſtion of ſenſorial power; ſo the accumulation of the ſenſorial power of volition in thoſe muſcles and organs of ſenſe, which are generally obedient to it, awakens the ſleeping perſon; when it has increaſed the quantity of voluntarity ſo much as to overbalance the defect of ſtimulus in one caſe, and the exhauſtion of ſenſorial power in the other; which latter requires a much longer time of ſleep than the former. So the cold paroxyſm of fever is produced either by defect of ſtimulus, or by previous exhauſtion of the ſenſorial power of ſome part of the ſyſtem; and the accumulation of the ſenſorial power of irritation in that part renews the action of it, when it has increaſed its irritability ſo much as to overbalance the defect of ſtimulus in one caſe, and the exhauſtion of ſenſorial power in the other; which latter requires a much longer torpor or cold fit than the former.

But in the cold paroxyſm of fever beſides the torpor of one part of the ſyſtem from defect of irritation, the remainder of it becomes torpid owing to defect of excitement of the ſenſorial power of aſſociation by the leſſened action of the part firſt affected. This torpor of the general ſyſtem remains, till the accumulation of the ſenſorial power of aſſociation has increaſed the aſſociability ſo much as to overbalance the defect of the excitement of aſſociation; then the torpor ceaſes, and if the firſt affected part has recovered its activity the other parts are all thrown into exceſs of action by their increaſed aſſociability, and the hot fit of fever is produced.

9. In the continued fevers with ſtrong pulſe the ſtomach is affected ſecondarily, and thus acts feebly from deficient excitement of the power of aſſociation; but the accumulation of the power of aſſociation thus produced in an organ ſubject to perpetual and energetic action, is ſo great as to affect the next link of the aſſociate train, which conſiſts of the heart and arteries; theſe therefore are exerted perpetually with increaſe of action.

In continued fevers with weak pulſe the torpid ſtomach is affected primarily by previous exhauſtion of its irritability by ſtimulus, as of contagious matter ſwallowed into it. The heart and arteries act feebly from deficient excitement of the power of aſſociation, owing to the torpor of the ſtomach, with which they are catenated; but the accumulation of the power of aſſociation, thus produced in organs ſubject to perpetual and energetic motion, is ſo great, as to affect the next link of the aſſociate train; which conſiſts of the capillaries of the ſkin or other glands; theſe therefore are exerted perpetually with great increaſe of action.

The continued fevers with ſtrong pulſe terminate by the reduction or exhauſtion of the ſenſorial power by violent action of the whole ſyſtem; which is followed either by return of health with the natural quantity of irritability, and of aſſociability, or by a total deſtruction of them both, and conſequent death.

In continued fevers with weak pulſe the ſtomach remains torpid during the whole courſe of the fever; and at length by the recovery of its irritability and ſenſibility effects the cure of it. Which generally happens about the firſt, ſecond, or third quarter of the lunar period, counted from the commencement of the diſeaſe, or continues a whole lunation, and ſometimes more; which gave riſe to what are termed critical days. See Sect. XXXVI. 4. on this ſubject. If the ſtomach does not recover from its torpor, the patient becomes emaciated, and dies exhauſted by the continuance of the increaſed action of the capillaries and abſorbents, and the want of nouriſhment.

The cure of continued fever with weak pulſe conſiſts firſt in weakening the undue action of the capillaries of the ſkin by ablution with cold water from 32 to 80 degrees of heat; or by expoſing them to cool air. Secondly by invigorating the actions of the ſtomach,

mach, by decreaſing them for a time, and thence accumulating the power of irritation, as by an emetic, or by iced water, or iced wine. Or by increaſe of ſtimulus, as by bark, wine, opium, and food, in ſmall quantities frequently repeated. Or by renewing the action of the ſtomach by ſlight electric ſhocks. Or by fomenting it frequently with water heated to 96 or 100 degrees. Or laſtly by exciting its power of aſſociation with other parts of the ſyſtem, as by a bliſter; which ſucceeds beſt when the extremities are cool; or by ſwinging, as in vertigo rotatoria.

If by the ſtimulus of the Peruvian bark on the fibres of the ſtomach, they regain their due action, the heart and arteries alſo regain their due action; as their ſenſorial power of aſſociation is now excited, and expended as uſual. And as there is then no accumulation of ſenſorial power in the heart and arteries, the capillaries ceaſe to act with too great energy, and the fever is cured.

Thirdly. If the heart and arteries could be themſelves ſtimulated into greater action, although the ſtomach remained torpid, they might probably by expending a greater quantity of ſenſorial power of irritation, prevent an accumulation of the ſenſorial power of aſſociation, (for theſe may poſſibly be only different modes of action of the ſpirit of animation,) and thus the too great action of the capillaries might be prevented and the fever ceaſe. This new mode of cure might poſſibly be accompliſhed, if the patient was to breathe a gallon or two of pure or diluted oxygen gas frequently in a day; which by paſſing through the moiſt membranes of the lungs and uniting with the blood might render it more ſtimulant, and thus excite the heart and arteries into greater action.

Fourthly. Greater energy might probably be given to the whole ſyſtem, and particularly to thoſe parts which act too feebly in fevers, as the ſtomach and the heart and arteries, if the action of the ſecerning veſſels of the brain could be increaſed in energy; this is probably one effect of all thoſe drugs, which when given in large quantity induce intoxication, as wine and opium. And when given with great caution in ſmall quantities uniformly repeated, as from three drops to five of the tincture of opium, but not more, every ſix hours, I believe they ſupply an efficacious medicine in fevers with great arterial debility; and the more ſo, if the Peruvian bark be exhibited alternately every ſix hours along with them. There are other means of exciting the veſſels of the brain into action; as firſt by decreaſing the ſtimulus of heat by temporary cold fomentation; ſecondly, increaſing the ſtimulus of heat by long continued warm fomentation; thirdly, by electricity, as very ſmall ſhocks paſſed through it in all directions; and laſtly by bliſters on the head. All thoſe require to be uſed with great caution, and eſpecially where there exiſts an evident ſtupor, as the removing of that is I believe frequently injurious. See ſtupor, Claſs I. 2. 5. 10.

The cure of fever with ſtrong pulſe conſiſts in the repeated uſe of veneſection, gentle cathartics, diluents;

medicines producing ſickneſs, as antimonials, digitalis; or the reſpiration of carbonated hydrogen; or by reſpiration of atmoſpheric air lowered by a mixture of hydrogen, azote, or carbonic acid gas, or by compreſſing the brain by whirling in a decumbent poſture, as if lying acroſs an horizontal mill-ſtone. See the former parts of this ſupplement for the methods of cure both of fevers with ſtrong and weak pulſe.

10. When any difficulty occurs in determining the weak pulſe from the ſtrong one, it may generally be aſſiſted by counting its frequency. For when an adult patient lies horizontally in a cool room, and is not hurried or alarmed by the approach of his phyſician, nor ſtimulated by wine or opium, the ſtrong pulſe ſeldom exceeds 118 or 120 in a minute; and the weak pulſe is generally not much below 130, and often much above that number, except when the patient has naturally a pulſe ſlower than uſual in his healthy ſtate. Secondly in ſitting up in bed, or changing the horizontal to a perpendicular poſture, the quickneſs of the weak pulſe is liable immediately to increaſe 10 or 20 pulſations in a minute, which does not I believe occur in the ſtrong pulſe, when the patient has reſted himſelf after the exertion of riſing.

XVII. *Concluſion.*

Thus have I given an outline of what may be termed the ſympathetic theory of fevers, to diſtinguiſh it from the mechanic theory of Boerhaave, the ſpaſmodic theory of Hoffman and of Cullen, and the putrid theory of Pringle. What I have thus delivered, I beg to be conſidered rather as obſervations and conjectures, than as things explained and demonſtrated; to be conſidered as a foundation and a ſcaffolding, which may enable future induſtry to erect a ſolid and a beautiful edifice, eminent both for its ſimplicity and utility, as well as for the permanency of its materials,—which may not moulder, like the ſtructures already erected, into the ſand of which they were compoſed; but which may ſtand unimpaired, like the Newtonian philoſophy, a rock amid the waſte of ages!

ADDITIONS.

ADDITIONS.

ADDITION I. page

At the end of the article Canities, in Claſs I. 2. 2. 11. *pleaſe to add the following:*

As mechanical injury from a percuſſion, or a wound, or a cauſtic, is liable to occaſion the hair of the part to become grey; ſo I ſuſpect the compreſſion of parts againſt each other of ſome animals in the womb is liable to render the hair of thoſe parts of a lighter colour; as ſeems often to occur in black cats and dogs. A ſmall terrier bitch now ſtands by me, which is black on all thoſe parts, which were external, when ſhe was wrapped up in the uterus, teres atque rotunda; and thoſe parts white, which were moſt conſtantly preſſed together; and thoſe parts tawny, which were generally but leſs conſtantly preſſed together. Thus the hair of the back from the forehead to the end of the tail is black, as well as that of the ſides, and external parts of the legs, both before and behind.

As in the uterus the chin of the whelp is bent down, and lies in contact with the fore part of the neck and breaſt; the tail is applied cloſe againſt the diviſion of the thighs behind; the inſide of the hinder thighs are preſſed cloſe to the ſides of the belly, all theſe parts have white hairs.

The fore-legs in the uterus lie on each ſide of the face; ſo that the feet cover part of the temples, and compreſs the prominent part of the upper eye-brows, but are ſo placed as to defend the eye-balls from preſſure; it is curious to obſerve, that the hair of the ſides of the face, and of the prominent upper eye-brows, are tawny, and of the inſide of the feet and legs, which covered them; for as this poſture admitted of more change in the latter weeks of geſtation, the colour of theſe parts is not ſo far removed from black, as of thoſe parts, where the contact or compreſſion was more uniform.

Where this uterine compreſſion of parts has not been ſo great as to render the hair white in other animals, it frequently happens, that the extremities of the body are white, as the feet, and noſes, and tips of the ears of dogs and cats and horſes, where the circulation is naturally weaker; whence it would ſeem, that the capillary glands, which form the hair, are impeded in the firſt inſtance by compreſſion, and in the laſt by the debility of the circulation in them. See Claſs I. 1. 2. 15.

This day, Auguſt 8th, 1794, I have ſeen a negro, who was born (as he reports) of black parents, both father and mother, at Kingſton in Jamaica, who has many large white blotches on the ſkin of his limbs and body; which I thought felt not ſo ſoft to the finger, as the black parts. He has a white divergent blaze from the ſummit of his noſe to the vertex of his head; the upper part of which, where it extends on the hairy ſcalp, has thick curled hair, like the other part of his head, but quite white. By theſe marks I ſuppoſed him to be the ſame black, who is deſcribed, when only two years old, in the Tranſactions of the American Philoſophical Society, Vol. II. page 292, where a female one is likewiſe deſcribed with nearly ſimilar marks.

The joining of the frontal bones, and the bregma, having been later than that of the other ſutures of the cranium, probably gave cauſe to the whiteneſs of the hair on theſe parts by delaying or impeding its growth.

ADDITION II.

The following extract from a letter of Dr. Beddoes on hydrocephalus internus, I eſteem a valuable addition to the article on that ſubject at Claſs I. 2. 3. 12.

“ Maſter L——, aged 9 years, became ſuddenly ill in the night about a week before I ſaw him. On the day before the attack, he had taken opening medicines, and had bathed afterwards. He had complained of violently acute pain in his head, ſhrieked frequently, ground his teeth hard, could not bear to have his head raiſed from the pillow, and was torpid or deaf. His tongue was white, pulſe 110 in the evening and full. As yet the pupil of the eye was irritable, and he had no ſtrabiſmus. He had been bled with leeches about the head, and bliſtered. I directed mercurial inunction, and calomel from 3 to 6 grains to be taken at firſt every ſix, and afterwards every three hours. This plan produced no ſenſible effect, and the patient died on the 18th day after the ſeizure. He had convulſion fits two days preceding his death, and the well-known ſymptoms of hydrocephalus internus all made their appearance. From what I had ſeen and read of this diſeaſe, I believed it to belong to inflammations, and at an earlier period I ſhould be tempted to bleed as largely as for pneumonia. The fluid found after death in the ventricules of the brain I impute to debility of the abſorbents induced by inflammation. My reaſons are briefly theſe; 1. The acuteneſs of the pain. 2. The ſtate of the pulſe. In the above caſe for the firſt 9 or 10 days it did not exceed 110, and was full and ſtrong. 3. To find out whether any febrile alternations took place, Maſter L.'s feet were frequently felt, and they were found at times cold, and at other times of a dry heat. I have many times ſeen this diſeaſe, but the patients were too young, or too far advanced, to inform me, whether they had chillneſs ſucceeded by heat at its onſet. 4. The diſorders to which the young are more peculiarly liable afford a preſumption, that hydrocephalus internus is an inflammatory diſeaſe; and this is confirmed by the regularity of the period, within which it finiſhes its courſe. And laſtly, does it not happen more frequently than is ſuſpected from external injury?

I have juſt now been well informed, that Dr. Ruſh has lately cured five out of ſix patients by copious bleedings. I relate here the reaſons for an opinion without pretending to a diſcovery. Something like this doctrine may be found in certain modern publications, but it is delivered in that vague and diffuſe ſtyle, which I truſt your example will baniſh from medical literature."

Clifton, near Briſtol,
July 28, 1795.

To this idea of Dr. Beddoes may by added, that the hydrocele generally ſucceeds an injury, and conſequent inflammation of the bag, which contains it. And that other dropſies, which principally attend inebriates, are conſequent to too great action of the mucous membranes by the ſtimulus of beer, wine, and ſpirits. And laſtly, that as theſe caſes of hydrocephalus end ſo fatally, a new mode of treating them is much to be deſired, and deſerves to be ſeriouſly attended to.

ADDITION III. ON VERTIGO.

To be placed after the additional Note at the end of Vol. I. on this Subject.

Having reperuſed the ingenious Eſſay of Dr. Wells on Single Viſion, and his additional obſervations in the Gentleman's Magazine on the apparent retrogreſſion of objects in vertigo, I am induced to believe, that this apparent retrogreſſion of objects is not always owing to the ſame cauſe.

When a perſon revolves with his eyes cloſed, till he becomes vertiginous, and then ſtands ſtill without opening them, he ſeems for a while to go forward in the ſame direction. This hallucination of his ideas cannot be owing to ocular ſpectra, becauſe, as Dr. Wells obſerves, no ſuch can have been formed; but it muſt ariſe from a ſimilar continuance or repetition of ideas belonging to the ſenſe of touch, inſtead of to the ſenſe of viſion; and ſhould therefore be called a tangible, not a viſual, vertigo. In common language this belief of continuing to revolve for ſome time, after he ſtands ſtill, when a perſon has turned round for a minute in the dark, would be called a deception of imagination.

Now at this time if he opens his eyes upon a gilt book, placed with other books on a ſhelf about the height of his eye, the gilt book ſeems to recede in the contrary direction; though his eyes are at this time kept quite ſtill, as well as the gilt book. For if his eyes were not kept ſtill, other books would fall on them in ſucceſſion; which, when I repeatedly made the experiment, did not occur; and which thus evinces, that no motion of the eyes is the cauſe of the apparent retroceſſion of the gilt book. Why then does it happen?—Certainly from an hallucination of ideas, or in common language the deception of imagination.

The vertiginous perſon ſtill imagines, that he continues to revolve forwards, after he has opened his eyes; and in conſequence that the objects, which his eyes happen to fall upon, are revolving backward;

as they would appear to do, if he was actually turning round with his eyes open. For he has been accuſtomed to obſerve the motions of bodies, whether apparent or real, ſo much more frequently by the eye than by the touch; that the preſent belief of his gyration, occaſioned by the hallucinations of the ſenſe of touch, is attended with ideas of ſuch imagined motions of viſible objects, as have always accompanied his former gyrations, and have thus been aſſociated with the muſcular actions and perceptions of touch, which occurred at the ſame time.

When the remains of colours are ſeen in the eye, they are termed ocular ſpectra; when remaining ſounds are heard in the ear, they may be called auricular murmurs; but when the remaining motions, or ideas, of the ſenſe of touch continue, as in this vertigo of a blind-folded perſon, they have acquired no name, but may be termed evaneſcent titillations, or tangible hallucinations.

Whence I conclude, that vertigo may have for its cauſe either the ocular ſpectra of the ſenſe of viſion, when a perſon revolves with his eyes open; or the auricular murmurs of the ſenſe of hearing, if he is revolved near a caſcade; or the evaneſcent titillations of the ſenſe of touch, if he revolves blindfold. All theſe I ſhould wiſh to call vaniſhing ideas, or ſenſual motions, of thoſe organs of ſenſe; which ideas, or ſenſual motions, have lately been aſſociated in a circle, and therefore for a time continue to be excited. And what are the ideas of colours, when they are excited by imagination or memory, but the repetition of finer ocular ſpectra? What the idea of ſounds, but the repetition of finer auricular murmurs? And what the ideas of tangible objects, but the repetition of finer evaneſcent titillations?

The tangible, and the auricular, and the viſual vertigo, are all perceived by many people for a day or two after long travelling in a boat or coach; the motions of the veſſel, or vehicle, or of the ſurrounding objects, and the noiſe of the wheels and oars, occur at intervals of reverie, or at the commencement of ſleep. See Sect. XX, 5. Theſe ideas, or ſenſual motions, of ſight, of hearing, and of touch, are ſucceeded by the ſame effects as the ocular ſpectra, the auricular murmurs, and the evaneſcent titillations above mentioned; that is, by a kind of vertigo, and cannot in that reſpect be diſtinguiſhed from them. Which is a further confirmation of the truth of the doctrine delivered in Sect. III. of this work, that the colours remaining in the eyes, which are termed ocular ſpectra, are ideas, or ſenſual motions, belonging to the ſenſe of viſion, which for too long a time continue their activity.

ADDITION IV. Of Voluntary Motions.

A correſpondent acquaints me, that he finds difficulty in underſtanding how the convulſions of the limbs in epilepſy can be induced by voluntary exertions. This I ſuſpect firſt to have ariſen from the double meaning of the words "involuntary motions;" which are ſometimes uſed for thoſe motions, which are performed without the interference of volition, as the pulſations of the heart and arteries; and at other times for thoſe actions, which occur, where two counter volitions oppoſe each other, and the ſtronger prevails; as in endeavouring to ſuppreſs laughter, and to ſtop the ſhudderings, when expoſed to cold. Thus when the poet writes,

> ———video meliora, proboque,
> Deteriora ſequor.——

The ſtronger volition actuates the ſyſtem, but not without the counteraction of unavailing ſmaller ones; which conſtitute deliberation.

A ſecond difficulty may have ariſen from the confined uſe of the words "to will," which in common diſcourſe generally mean to chooſe after deliberation; and hence our will or volition is ſuppoſed to be always in our own power. But the will or voluntary power, acts always from motive, as explained in Sect. XXXIV. 1. and in Claſs IV. 1. 3. 2. and III. 2. 1. 12. which motive can frequently be examined previous to action, and balanced againſt oppoſite motives, which is called deliberation; at other times the motive is ſo powerful as immediately to excite the ſenſorial power of volition into action, without a previous balancing of oppoſite motives, or counter volitions. The former of theſe volitions is exerciſed in the common purpoſes of life, and the latter in the exertions of epilepſy and inſanity.

It is difficult *to think without words*, which however all thoſe muſt do, who diſcover new truths by reaſoning; and ſtill more difficult, when the words in common uſe deceive us by their twofold meanings, or by the inaccuracy of the ideas, which they ſuggeſt.

ADDITION V. OF FIGURE.

I feel myſelf much obliged by the accurate attention given to the Firſt Part of Zoonomia, and by the ingenious criticiſms beſtowed on it, by the learned writers of that article both in the Analytical and Engliſh Reviews. Some circumſtances, in which their ſentiments do not accord with thoſe expreſſed in the work, I intend to reconſider, and to explain further at ſome future time. One thing, in which both theſe gentlemen ſeem to diſſent from me, I ſhall now mention, it is concerning the manner, in which we acquire the idea of figure; a circumſtance of great importance in the knowledge of our intellect, as it ſhews the cauſe of the accuracy of our ideas of motion, time, ſpace, number, and of the mathematical ſciences, which are concerned in the menſurations or proportions of figure.

This I imagine may have in part ariſen from the prepoſſeſſion, which has almoſt univerſally prevailed, that ideas are immaterial beings, and therefore poſſeſs no properties in common with ſolid matter. Which I ſuppoſe to be a fanciful hypotheſis, like the ſtories of ghoſts and apparitions, which have ſo long amuſed, and ſtill amuſe, the credulous without any foundation in nature.

The exiſtence of our own bodies, and of their ſolidity, and of their figure, and of their motions, is taken for granted in my account of ideas; becauſe the ideas themſelves are believed to conſiſt of motions or configurations of ſolid fibres; and the queſtion now propoſed is, how we become acquainted with the figures of bodies external to our organs of ſenſe? Which I can only repeat from what is mentioned in Sect. XIV. 2. 2. that if part of an organ of ſenſe be ſtimulated into action, as of the ſenſe of touch, that part ſo ſtimulated into action muſt poſſeſs figure, which muſt be ſimilar to the figure of the body, which ſtimulates it.

Another previous prepoſſeſſion of the mind, which may have rendered the manner of our acquiring the knowledge of figure leſs intelligible, may have ariſen from the common opinion of the perceiving faculty reſiding in the head; whereas our daily experience ſhews, that our perception (which conſiſts of an idea, and of the pleaſure or pain it occaſions) exiſts principally in the organ of ſenſe, which is ſtimulated into action; as every one, who burns his finger in the candle, muſt be bold to deny.

When an ivory triangle is preſſed on the palm of the hand, the figure of the ſurface of the part of the organ of touch thus compreſſed is a triangle, reſembling in figure the figure of the external body, which compreſſes it. The action of the ſtimulated fibres, which conſtitute the idea of hardneſs and of figure, remains in this part of the ſenſorium, which forms the ſenſe of touch; but the ſenſorial motion, which conſtitutes pleaſure or pain, and which is excited in conſequence of theſe fibrous motions of the organ of ſenſe, is propagated to the central parts of the ſenſorium, or to the whole of it; though this generally occurs in leſs degree of energy, than it exiſts in the ſtimulated organ of ſenſe; as in the inſtance above mentioned of burning a finger in the candle.

Some, who have eſpouſed the doctrine of the immateriality of ideas, have ſeriouſly doubted the exiſtence of a material world, with which only our ſenſes acquaint us; and yet have aſſented to the exiſtence of ſpirit, with which our ſenſes cannot acquaint us; and have finally allowed, that all our knowledge is derived through the medium of our ſenſes! They forget, that if the ſpirit of animation had no properties in common with matter, it could neither affect nor be affected by the material body. But the knowledge of our own material exiſtence being granted, which I ſuſpect few rational perſons will ſeriouſly deny, the exiſtence of a material external world follows in courſe; as our perceptions, when we are awake and not inſane, are diſtinguiſhed from thoſe excited by ſenſation, as in our dreams, and from thoſe excited by volition or by aſſociation as in inſanity and reverie, by the power we have of comparing the preſent perceptions of one ſenſe with thoſe of another, as explained in Sect. XIV. 2. 5. And alſo by comparing the tribes of ideas, which the ſymbols of pictures, or of languages, ſuggeſt to us, by intuitive analogy with our previous experience, that is, with the common courſe of nature. See Claſs III. 2. 2. 3. on Credulity.

ADDITION VI.

Pleaſe to add the following at the end of page 14.

Cold and hot Fit.

As the torpor, with which a fit of fever commences, is ſometimes owing to defect of ſtimulus, as in going into the cold-bath; and ſometimes to a previous exhauſtion of the ſenſorial power by the action of ſome violent ſtimulus, as after coming out of a hot room into cold air; a longer time muſt elapſe, before there can be a ſufficient accumulation of ſenſorial power to produce a hot fit in one caſe than in the other. Becauſe in the latter caſe the quantity of ſenſorial power previouſly expended muſt be ſupplied, before an accumulation can begin.

The cold paroxyſm commences, when the torpor of a part becomes ſo great, and its motions in conſequence ſo ſlow or feeble, as not to excite the ſenſorial power of aſſociation; which in health contributes to move the reſt of the ſyſtem, which is catenated with it. And the hot fit commences by the accumulation of the ſenſorial power of irritation of the part firſt affected, either ſo as to counteract its deficient ſtimulus, or its previous waſte of ſenſorial power; and it becomes general by the accumulation of the ſenſorial power of aſſociation; which is excited by the renovated actions of the part firſt affected; or becomes ſo great as to overbalance the deficient excitement of it. On all theſe accounts the hot fit cannot be ſuppoſed to bear any proportion to the cold one in length of time, though the latter may be the conſequence of the former. See Suppl. I. 16. 8.

ADDITION VII. On Warmth.

To be added at the end of the Species Sudor Calidus, in Claſs I. 1. 2. 3. Vol I. p 27

When the heat of the body in weak patients in fevers is increaſed by the ſtimulus of the points of flannel, a greater conſequent debility ſucceeds, than when it is produced by the warmth of fire; as in the former the heat is in part owing to the increaſed activity of the ſkin, and conſequent expenditure of ſenſorial power; whereas in the latter caſe it is in part owing to the influx of the fluid matter of heat.

So the warmth produced by equitation, or by rubbing the body and limbs with a ſmooth bruſh or hand, as is done after bathing in ſome parts of the Eaſt, does not expend nearly ſo much ſenſorial power, as when the warmth is produced by the locomotion of the whole weight of the body by muſcular action, as in walking, or running, or ſwimming. Whence the warmth of a fire is to be preferred to flannel ſhirts for weak people, and the agitation of a horſe to exerciſe on foot. And I ſuppoſe thoſe, who are unfortunately loſt in ſnow, who are on foot, are liable to periſh ſooner by being exhauſted by their muſcular exertions; and might frequently preſerve themſelves by lying on the ground, and covering themſelves with ſnow, before they were too much exhauſted by fatigue. See Botan. Garden, Vol. II the note on Barometz.

ADDITION VIII. Puerperal Fever.

To be added to Claſs II. 1. 6. 16.

A very intereſting account of the puerperal fever, which was epidemic at Aberdeen, has been lately publiſhed by Dr. Alexander Gordon. (Robinſon, London.) In ſeveral diſſections of thoſe, who died of this diſeaſe, purulent matter was found in the cavity of the abdomen; which he aſcribes to an eryſipelatous inflammation of the peritonæum, as its principal ſeat, and of its productions, as the omentum, meſentery, and peritonæal coat of the inteſtines.

He believes, that it was infectious, and that the contagion was always carried by the accoucheur or the nurſe from one lying-in woman to another.

The diſeaſe began with violent unremitting pain of the abdomen on the day of delivery, or the next day, with ſhuddering, and very quick pulſe, often 140 in a minute. In this ſituation, if he ſaw the patient within 12 or 24 hours of her ſeizure, he took away from 16 to 24 ounces of blood, which was always ſizy. He then immediately gave a cathartic conſiſting of three grains of calomel, and 40 grains of powder of jalap. After this had operated, he gave an opiate at night; and continued the purging and the opiate for ſeveral days.

He aſſerts, that almoſt all thoſe, whom he was permitted to treat in this manner early in the diſeaſe, recovered to the number of 50; and that almoſt all the reſt died. But that when two or three days were elapſed, the patient became too weak for this method; and the matter was already formed, which deſtroyed them. Except that he ſaw two patients, who recovered after diſcharging a large quantity of matter at the navel. And a few, who were relieved by the appearance of external eryſipelas on the extremities.

This diſeaſe, conſiſting of an eryſipelatous inflammation, may occaſion the great debility ſooner to occur than in inflammation of the uterus; which latter is neither eryſipelatous, I ſuppoſe, nor contagious. And the ſucceſs of Dr. Gordon's practice ſeems to correſpond with that of Dr. Ruſh in the contagious fever or plague at Philadelphia; which appeared to be much aſſiſted by early evacuations. One caſe I ſaw ſome time ago, where violent unceaſing pain of the whole abdomen occurred a few hours after delivery, with quick pulſe; which ceaſed after the patient had twice loſt about eight ounces of blood, and had taken a moderate cathartic with calomel.

This caſe induces me to think, that it might be ſafer and equally efficacious, to take leſs blood at firſt, than Dr. Gordon mentions, and to repeat the operation in a few hours, if the continuance of the ſymptoms ſhould require it. And the ſame in reſpect to the cathartic, which might perhaps be given in leſs quantity, and repeated every two or three hours.

Nor ſhould I wiſh to give an opiate after the firſt veneſection and cathartic; as I ſuſpect that this might be injurious, except thoſe evacuations had emptied the veſſels ſo much, that the ſtimulus of the opiate ſhould act only by increaſing the abſorption of the new veſſels or fluids produced on the ſurfaces of the inflamed membranes. In other inflammations of the bowels, and in acute rheumatiſm, I have ſeen the diſeaſe much prolonged, and I believe ſometimes rendered fatal, by the too early adminiſtration of opiates, either along with cathartics, or at their intervals; while a ſmall doſe of opium given after ſufficient evacuations produces abſorption only by its ſtimulus, and much contributes to the cure of the patient. We may have viſible teſtimony of this effect of opium, when a ſolution of it is put into an inflamed eye; if it be thus uſed previous to ſufficient evacuation, it increaſes the inflammation; if it be uſed after ſufficient evacuation, it increaſes abſorption only, and clears the eye in a very ſmall time.

I cannot omit obſerving, from conſidering theſe circumſtances, how unwiſe is the common practice of giving an opiate to every woman immediately after her delivery, which muſt often have been of dangerous conſequence.

END OF THE SECOND PART.

ZOONOMIÆ AUCTORI

S. P. D.

AMICUS.

CURRUS TRIUMPHALIS MEDICINÆ.

Currus it Hygeiæ, Medicus movet arma triumphans,
  Undique victa fugit lurida turma mali.——
Laurea dum Phœbi viridis tua tempora cingit,
  Nec mortale ſonans Fama coronat opus;
Poſt equitat trepidans, repetitque Senectus in aurem,
  Voce canens ſtridulâ, "ſis memor ipſe mori!"

The liberality and candour by which Dr. Darwin is no leſs diſtinguiſhed than by his talents and his ſcience, will lead him to look with indulgence on an attempt to convey to the Engliſh reader, in the following unpoliſhed lines, ſomething of the ſpirit and ſentiment which characterize the preceding ſhort but elegant and nervous poetic addreſs.

TO THE

AUTHOR OF ZOONOMIA

BY A FRIEND.

THE TRIUMPHAL CAR OF MEDICINE.

HEALTH'S car triumphant glides o'er ſmiling plains,
While DARWIN'S hand directs the ſilken reins.
As ſlow the wheels on golden axles turn,
And wide through air irradiate glories burn,
Youth, *Joy* and *Love* around the pageant play,
And reſcued thouſands throng the brightening way,
With brow auguſt, high on the beamy car,
The CONQUEROR burns in dazzling ſpoils of war!
—DISEASE with vanquiſh'd hoſts, in wild affright,
Retiring hides his Demon-head in night!
Illuſtrious *Sage!* while round thy brow divine,
In fair luxuriance Delphic wreaths entwine,
And Fame with ſounding trump and ſilver tongue,
Embalms thy golden page, thy deathleſs ſong!
With trembling limbs *Old Age* moves in the rear,
Upborne on ſnow-white ſteed, and in thy ear,
Proclaims in accents ſhrill, with panting breath,
" Remember thou muſt yield to conquering DEATH!"

C. C.

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ZOONOMIA;

OR,

The Laws of Organic Life.

PART III.

CONTAINING

THE ARTICLES OF THE MATERIA MEDICA.

WITH AN ACCOUNT OF THE

OPERATION OF MEDICINES.

IN VIVUM CORPUS
AGUNT MEDICAMENTA.

PREFACE.

THE MATERIA MEDICA includes all thoſe ſubſtances, which may contribute to the reſtoration of health. Theſe may be conveniently diſtributed under ſeven articles according to the diverſity of their operations.

1. NUTRIENTIA, or thoſe things which preſerve in their natural ſtate the due exertions of all the irritative motions.

2. INCITANTIA, or thoſe things which increaſe the exertions of all the irritative motions.

3. SECERNENTIA, or thoſe things which increaſe the irritative motions, which conſtitute ſecretion.

4. SORBENTIA, or thoſe things which increaſe the irritative motions, which conſtitute abſorption.

5. INVERTENTIA, or thoſe things which invert the natural order of the ſucceſſive irritative motions.

6. Revertentia, or thoſe things which reſtore the natural order of the inverted irritative motions.

7. Torpentia, thoſe things which diminiſh the exertions of all the irritative motions.

It is neceſſary to apprize the reader, that in the following account of the virtues of Medicines their uſual doſes are always ſuppoſed to be exhibited; and the patient to be expoſed to the degree of exterior heat, which he has been accuſtomed to, (where the contrary is not mentioned), as any variation of either of theſe circumſtances varies their effects.

ARTICLES

OF THE

MATERIA MEDICA.

ART. I.

NUTRIENTIA.

I. 1. THOSE THINGS, which preſerve in their natural ſtate the due exertions of all the irritative motions, are termed nutrientia; they produce the growth, and reſtore the waſte, of the ſyſtem. Theſe conſiſt of a variety of mild vegetable and animal ſubſtances, water, and air.

2. Where ſtronger ſtimuli have been long uſed, they become neceſſary for this purpoſe, as muſtard, ſpice, ſalt, beer, wine, vinegar, alcohol, opium. Which however, as they are unnatural ſtimuli, and difficult to manage in reſpect to quantity, are liable to ſhorten the ſpan of human life, ſooner rendering the ſyſtem incapable of being ſtimulated into action by the nutrientia. See Sect. XXXVII. 4. On the ſame account life is ſhorter in warmer climates than in more temperate ones.

II. OB-

II. Observations on the Nutrientia.

I. 1. The fleſh of animals contains more nouriſhment, and ſtimulates our abſorbent and ſecerning veſſels more powerfully, than the vegetable productions, which we uſe as food; for the carnivorous animals can faſt longer without injury than the graminivorous; and we feel ourſelves warmer and ſtronger after a meal of fleſh than of grain. Hence in diſeaſes attended with cold extremities and general debility this kind of diet is preferred; as in rickets, dropſy, ſcrophula, and in hyſteric and hypochondriac caſes, and to prevent the returns of agues. Might not fleſh in ſmall quantities bruiſed to a pulp be more advantageouſly uſed in fevers attended with debility than vegetable diet?

That fleſh, which is of the darkeſt colour, generally contains more nouriſhment, and ſtimulates our veſſels more powerfully, than the white kinds. The fleſh of the carnivorous and piſcivorous animals is ſo ſtimulating, that it ſeldom enters into the food of European nations, except the ſwine, the Soland gooſe (Pelicanus Baſſanus), and formerly the ſwan. Of theſe the ſwine and the ſwan are fed previouſly upon vegetable aliment; and the Soland gooſe is taken in very ſmall quantity, only as a whet to the appetite. Next to theſe are the birds, that feed upon inſects, which are perhaps the moſt ſtimulating and the moſt nutritive of our uſual food.

It is ſaid that a greater quantity of volatile alkali can be obtained from this kind of fleſh, to which has been aſcribed its ſtimulating quality. But it is more probable, that freſh fleſh contains only the elements of volatile alkali.

2. Next to the dark coloured fleſh of animals, the various tribes of ſhell-fiſh ſeem to claim their place, and the wholeſome kinds of muſhrooms, which muſt be eſteemed animal food, both for their alkaleſcent tendency, their ſtimulating quality, and the quantity of nouriſhment, which they afford; as oyſters, lobſters, crabfiſh, ſhrimps; muſhrooms; to which perhaps might be added ſome of the fiſh without ſcales; as the eel, barbolt, tench, ſmelt, turbot, turtle.

The fleſh of many kinds of fiſh, when it is ſuppoſed to have undergone a beginning putrefaction, becomes luminous in the dark. This ſeems to ſhew a tendency in the phoſphorus to eſcape, and combine with the oxygen of the atmoſphere; and would hence ſhew, that this kind of fleſh is not ſo perfectly animalized as thoſe before mentioned. This light, as it is frequently ſeen on rotten wood, and ſometimes on veal, which has been kept too long, as I have been told, is commonly ſuppoſed to have its cauſe from putrefaction; but is nevertheleſs moſt probably of phoſphoric origin, like that ſeen in the dark on oyſter-ſhells, which have previouſly been ignited, and afterwards expoſed to the ſunſhine, and on the Bolognian ſtone. See Botan. Gard. Vol. I. Cant. I. line 1. and 2, the note.

3. The fleſh of young animals, as of lamb, veal, and ſucking pigs, ſupplies us with a ſtill leſs ſtimulating food. The broth of theſe is ſaid to become ſour, and continues ſo a conſiderable time before it changes into putridity; ſo much does their fleſh partake of the chemical properties of the milk, with which theſe animals are nouriſhed.

4. The white meats, as of turkey, partridge, pheaſant, fowl, with their eggs, ſeem to be the next in mildneſs; and hence are generally firſt allowed to convaleſcents from inflammatory diſeaſes.

5. Next to thoſe ſhould be ranked the white river-fiſh, which have ſcales, as pike, perch, gudgeon.

II. 1. Milk unites the animal with the vegetable ſource of our nouriſhment, partaking of the properties of both. As it contains ſugar, and will therefore ferment and produce a kind of wine or ſpirit, which is a common liquor in Siberia; or will run into an acid by ſimple agitation, as in the churning of cream; and laſtly, as it contains coagulable lymph, which will undergo the proceſs of putrefaction like other animal ſubſtances, as in old cheeſe.

2. Milk may be ſeparated by reſt or by agitation into cream, butter, butter-milk, whey, curd. The cream is eaſier of digeſtion to adults, becauſe it contains leſs of the coagulum or cheeſy part, and is alſo

more nutritive. Butter conſiſting of oil between an animal and vegetable kind contains ſtill more nutriment, and in its recent ſtate is not difficult of digeſtion if taken in moderate quantity. See Art. I. 2. 3. 2. Butter-milk if it be not bitter is an agreeable and nutritive fluid, if it be bitter it has ſome putrid parts of the cream in it, which had been kept too long; but is perhaps not leſs wholeſome for being ſour to a certain degree: as the inferior people in Scotland chooſe ſour milk in preference to ſkimmed milk before it is become ſour. Whey is the leaſt nutritive and eaſieſt of digeſtion. And in the ſpring of the year, when the cows feed on young graſs, it contains ſo much of vegetable properties, as to become a ſalutary potation, when drank to about a pint every morning to thoſe, who during the winter have taken too little vegetable nouriſhment, and who are thence liable to bilious concretions.

3. Cheeſe is of various kinds, according to the greater or leſs quantity of cream, which it contains, and according to its age. Thoſe cheeſes, which are eaſieſt broken to pieces in the mouth, are generally eaſieſt of digeſtion, and contain moſt nutriment. Some kinds of cheeſe, though ſlow of digeſtion, are alſo ſlow in changing by chemical proceſſes in the ſtomach, and therefore will frequently agree well with thoſe, who have a weak digeſtion; as I have ſeen toaſted cheeſe vomited up a whole day after it was eaten without having undergone any apparent change, or

given any uneaſineſs to the patient. It is probable a portion of ſugar, or of animal fat, or of the gravy of boiled or roaſted meat, mixed with cheeſe at the time of making it, might add to its pleaſant and nutritious quality.

4. The reaſon, why autumnal milk, is ſo much thicker or coagulable than vernal milk, is not eaſy to underſtand, but as new milk is in many reſpects ſimlar to chyle, it may be conſidered as food already in part digeſted by the animal it is taken from, and thence ſupplies a nutriment of eaſy digeſtion. But as it requires to be curdled by the gaſtric acid, before it can enter the lacteals, as is ſeen in the ſtomachs of calves, it ſeems more ſuitable to children, whoſe ſtomachs abound more with acidity, than to adults; but nevertheleſs ſupplies good nouriſhment to many of the latter, and particularly to thoſe, who uſe vegetable food, and whoſe ſtomachs have not been much accuſtomed to the unnatural ſtimulus of ſpice, ſalt, and ſpirit. See Claſs I. 1. 2. 5.

III. 1. The ſeeds, roots, leaves, and fruits of plants, conſtitute the greateſt part of the food of mankind; the reſpective quantities of nouriſhment, which theſe contain, may perhaps be eſtimated from the quantity of ſtarch, or of ſugar, they can be made to produce: in farinaceous ſeeds, the mucilage ſeems gradually to be converted into ſtarch, while they remain in our granaries; and the ſtarch by the germination of the young plant, as in making malt from barley, or by animal digeſtion, is converted into ſugar. Hence old wheat and beans contain more ſtarch than new; and in our ſtomachs other vegetable and animal materials are converted into ſugar; which conſtitutes in all creatures a part of their chyle.

Hence it is probable, that ſugar is the moſt nutritive part of vegetables; and that they are more nutritive, as they are convertible in greater quantity into ſugar by the power of digeſtion; as appears from ſugar being found in the chyle of all animals, and from its exiſting in great quantity in the urine of patients in the diabætes, of which a curious caſe is related in Sect. XXIX. 4. where a man labouring under this malady eat and drank an enormous quantity, and ſometimes voided ſixteen pints of water in a day, with an ounce of ſugar in each pint.

2. Oil, when mixed with mucilage or coagulable lymph, as in cream or new milk, is eaſy of digeſtion, and conſtitutes probably the moſt nutritive part of animal diet; as oil is another part of the chyle of all animals. As theſe two materials, ſugar and butter, contain much nutriment under a ſmall volume, and readily undergo ſome chemical change ſo as to become acid or rancid; they are liable to diſturb weak ſtomachs, when taken in large quantity, more than aliment, which contains leſs nouriſhment, and is at the ſame time leſs liable to chemical changes; becauſe the chyle is produced quicker than the torpid lacteals can

abſorb it, and thence undergoes a further chemical proceſs. Sugar and butter therefore are not ſo eaſily digeſted, when taken in large quantity, as thoſe things, which contain leſs nutriment; hence, where the ſtomach is weak, they muſt be uſed in leſs quantity. But the cuſtom of ſome people in reſtraining children entirely from them, is depriving them of a very wholeſome, agreeable, and ſubſtantial part of their diet. Honey, manna, ſap-juice, are different kinds of leſs pure ſugar.

3. All the eſculent vegetables contain a bland oil, or mucilage, or ſtarch, or ſugar, or acid; and, as their ſtimulus is moderate, are properly given alone as food in inflammatory diſeaſes; and mixed with milk conſtitute the food of thouſands. Other vegetables poſſeſs various degrees and various kinds of ſtimulus; and to theſe we are beholden for the greater part of our Materia Medica, which produce nauſea, ſickneſs, vomiting, catharſis, intoxication, inflammation, and even death, if unſkilfully adminiſtered.

The acrid or intoxicating, and other kinds of vegetable juices, ſuch as produce ſickneſs, or evacuate the bowels, or ſuch even as are only diſagreeable to the palate, appear to be a part of the defence of thoſe vegetables, which poſſeſs them, from the aſſaults of larger animals or of inſects. As mentioned in the Botanic Garden, Part II. Cant. I. line 161, note. This appears in a forcible manner from the peruſal of ſome travels, which have been publiſhed of thoſe unfortunate people, who have ſuffered ſhipwreck on uncultivated countries, and have with difficulty found food to ſubſiſt, in otherwiſe not inhoſpitable climates.

4. As theſe acrid and intoxicating juices generally reſide in the mucilage, and not in the ſtarch of many roots, and ſeeds, according to the obſervation of M. Parmentier, the wholeſome or nutritive parts of ſome vegetables may be thus ſeparated from the medicinal parts of them. Thus if the root of white briony be raſped into cold water, by means of a bread-grater made of a tinned iron plate, and agitated in it, the acrid juice of the root along with the mucilage will be diſſolved, or ſwim, in the water; while a ſtarch perfectly wholeſome and nutritious will ſubſide, and may be uſed as food in times of ſcarcity.

M. Parmentier further obſerves, that potatoes contain too much mucilage in proportion to their ſtarch, which prevents them from being converted into good bread. But that if the ſtarch be collected from ten pounds of raw potatoes by grating them into cold water, and agitating them, as above mentioned; and if the ſtarch thus procured be mixed with other ten pounds of boiled potatoes, and properly ſubjected to fermentation like wheat flour, that it will make as good bread as the fineſt wheat.

Good bread may alſo be made by mixing wheat-flour with boiled potatoes. Eighteen pounds of wheat-flour are ſaid to make twenty-two pounds and a half of bread. Eighteen pounds of wheat-flour mixed with nine pounds of boiled potatoes, are ſaid to make twenty-nine pounds and a half of bread. This difference of weight muſt ariſe from the difference of the previous dryneſs of the two materials. The potatoes might probably make better flour, if they were boiled in ſteam, in a cloſe veſſel, made ſome degrees hotter than common boiling water.

Other vegetable matters may be deprived of their too great acrimony by boiling in water, as the great variety of the cabbage, the young tops of white briony, water-creſſes, aſparagus, with innumerable roots, and ſome fruits. Other plants have their acrid juices or bitter particles diminiſhed by covering them from the light by what is termed blanching them, as the ſtems and leaves of cellery, endive, ſea-kale. The former method either extracts or decompoſes the acrid particles, and the latter prevents them from being formed. See Botanic Garden, Vol. I. additional note XXXIV. on the Etiolation of vegetables.

5. The art of cookery, by expoſing vegetable and animal ſubſtances to heat, has contributed to increaſe the quantity of the food of mankind by other means beſides that of deſtroying their acrimony. One of theſe is by converting the acerb juices of ſome fruits into ſugar, as in the baking of unripe pears, and the bruiſing of unripe apples; in both which ſituations the life of the vegetable is deſtroyed, and the converſion of the harſh juice into a ſweet one muſt be

performed by a chemical proceſs; and not by a vegetable one only, as the germination of barley in making malt has generally been ſuppoſed.

Some circumſtances, which ſeem to injure the life of ſeveral fruits, ſeem to forward the ſaccharine proceſs of their juices. Thus if ſome kinds of pears are gathered a week before they would ripen on the tree, and are laid on a heap and covered, their juice becomes ſweet many days ſooner. The taking off a circular piece of the bark from a branch of a pear-tree cauſes the fruit of that branch to ripen ſooner by a fortnight, as I have more than once obſerved. The wounds made in apples by inſects occaſion thoſe apples to ripen ſooner; caprification, or the piercing of figs, in the iſland of Malta, is ſaid to ripen them ſooner; and I am well informed, that when bunches of grapes in this country have acquired their expected ſize, that if the ſtalk of each bunch be cut half through, that they will ſooner ripen.

The germinating barley in the malt-houſe I believe acquires little ſweetneſs, till the life of the ſeed is deſtroyed, and the ſaccharine proceſs then continued or advanced by the heat in drying it. Thus in animal digeſtion, the ſugar produced in the ſtomach is abſorbed by the lacteals as faſt as it is made, otherwiſe it ferments, and produces flatulency; ſo in the germination of barley in the malt-houſe, ſo long as the new plant lives, the ſugar, I ſuppoſe, is abſorbed as faſt as it is made; but that, which we uſe in making beer, is the ſugar produced by a chemical proceſs after the death of the young plant, or which is made more expeditiouſly, than the plant can abſorb it.

It is probably this ſaccharine proceſs, which obtains in new hay-ſtacks too haſtily, and which by immediately running into fermentation produces ſo much heat as to ſet them on fire. The greateſt part of the grain, or ſeeds, or roots, uſed in the diſtilleries, as wheat, canary ſeed, potatoes, are not I believe previouſly ſubjected to germination, but are in part by a chemical proceſs converted into ſugar, and immediately ſubjected to vinous fermentation; and it is probable a proceſs may ſometime be diſcovered of producing ſugar from ſtarch or meal; and of ſeparating it from them for domeſtic purpoſes by alcohol, which diſſolves ſugar but not mucilage; or by other means.

Another method of increaſing the nutriment of mankind by cookery, is by diſſolving cartilages and bones, and tendons, and probably ſome vegetables, in ſteam or water at a much higher degree of heat than that of boiling. This is to be done in a cloſe veſſel, which is called Papin's digeſter; in which, it is ſaid, that water may be made red-hot, and will then diſſolve all animal ſubſtances; and might thus add to our quantity of food in times of ſcarcity. This veſſel ſhould be made of iron, and ſhould have an oval opening at top, with an oval lid of iron larger than the aperture; this lid ſhould be ſlipped in endways, when the veſſel is filled, and then turned, and raiſed by a ſcrew above it into contact with the under edges of the aperture. There ſhould alſo be a ſmall tube or hole covered with a weighted valve to prevent the danger of burſting the digeſter.

Where the powers of digeſtion are weakened, broths made by boiling animal and vegetable ſubſtances in water afford a nutriment; though I ſuppoſe not ſo great as the fleſh and vegetables would afford, if taken in their ſolid form, and mixed with ſaliva in the act of maſtication. The aliment thus prepared ſhould be boiled but a ſhort time, nor ſhould be ſuffered to continue in our common kitchen-utenſils afterwards, as they are lined with a mixture of half lead and half tin, and are therefore unwholeſome, though the copper is completely covered. And thoſe ſoups, which have any acid or wine boiled in them, unleſs they be made in ſilver, or in china, or in thoſe pot-veſſels, which are not glazed by the addition of lead, are truly poiſonous; as the acid, as lemon-juice or vinegar, when made hot, erodes or diſſolves the lead and tin lining of the copper-veſſels, and the leaden glaze of the porcelain ones. Hence, where ſilver cannot be had, iron veſſels are preferable to tinned copper ones; or thoſe made of tinned iron-plates in the common tin-ſhops, which are ſaid to be covered with pure or block tin.

6. Another circumſtance, which facilitates the nouriſhment of mankind, is the mechanic art of grinding farinaceous ſeeds into powder between mill-ſtones; which may be called the artificial teeth of ſociety. It

is probable, that ſome ſoft kinds of wood, eſpecially when they have undergone a kind of fermentation, and become of looſer texture, might be thus uſed as food in times of famine.

Nor is it improbable, that hay, which has been kept in ſtacks, ſo as to undergo the ſaccharine proceſs, may be ſo managed by grinding and by fermentation with yeaſt like bread, as to ſerve in part for the ſuſtenance of mankind in times of great ſcarcity. Dr. Prieſtley gave to a cow for ſome time a ſtrong infuſion of hay in large quantity for her drink, and found that ſhe produced during this treatment above double the quantity of milk. Hence if bread cannot be made from ground hay, there is great reaſon to ſuſpect, that a nutritive beverage may be thus prepared either in its ſaccharine ſtate, or fermented into a kind of beer.

In times of great ſcarcity there are other vegetables, which though not in common uſe, would moſt probably afford wholeſome nouriſhment, either by boiling them, or drying and grinding them, or by both thoſe proceſſes in ſucceſſion. Of theſe are perhaps the tops and the bark of all thoſe vegetables, which are armed with thorns or prickles, as gooſeberry trees, holly, gorſe, and perhaps hawthorn. The inner bark of the elm tree makes a kind of gruel. And the roots of fern, and probably of very many other roots, as of graſs and of clover taken up in winter, might yield nouriſhment either by boiling or baking, and ſeparating the fibres from the pulp by beating them; or by getting only the ſtarch from thoſe, which poſſeſs an acrid mucilage, as the white briony.

7. However the arts of cookery and of grinding may increaſe or facilitate the nouriſhment of mankind, the great ſource of it is from agriculture. In the ſavage ſtate, where men live ſolely by hunting, I was informed by Dr. Franklin, that there was ſeldom more than one family exiſted in a circle of five miles diameter; which in a ſtate of paſturage would ſupport ſome hundred people, and in a ſtate of agriculture many thouſands. The art of feeding mankind on ſo ſmall a grain as wheat, which ſeems to have been diſcovered in Egypt by the immortal name of Ceres, ſhewed greater ingenuity than feeding them with the large roots of potatoes, which ſeem to have been a diſcovery of ill-fated Mexico.

This greater production of food by agriculture than by paſturage, ſhews that a nation nouriſhed by animal food will be leſs numerous than if nouriſhed by vegetable; and the former will therefore be liable, if they are engaged in war, to be conquered by the latter, as Abel was ſlain by Cain. This is perhaps the only valid argument againſt incloſing open arable fields. The great production of human nouriſhment by agriculture and paſturage evinces the advantage of ſociety over the ſavage ſtate; as the number of mankind becomes increaſed a thouſand fold by the arts of agriculture and paſturage; and their happineſs is probably under good governments improved in as great a proportion, as they become liberated from the hourly fear of beaſts of prey, from the daily fear of famine, and of the occaſional incurſions of their cannibal neighbours.

But paſturage cannot exiſt without property both in the ſoil, and the herds which it nurtures; and for the invention of arts, and production of tools neceſſary to agriculture, ſome muſt think, and others labour; and as the efforts of ſome will be crowned with greater ſucceſs than thoſe of others, an inequality of the ranks of ſociety muſt ſucceed; but this inequality of mankind in the preſent ſtate of the world is too great for the purpoſes of producing the greateſt quantity of human nouriſhment, and the greateſt ſum of human happineſs; there ſhould be no ſlavery at one end of the chain of ſociety, and no deſpotiſm at the other.—By the future improvements of human reaſon ſuch governments may poſſibly hereafter be eſtabliſhed, as may a hundred-fold increaſe the numbers of mankind, and a thouſand-fold their happineſs.

IV. 1. Water muſt be conſidered as a part of our nutriment, becauſe ſo much of it enters the compoſition of our ſolids as well as of our fluids; and becauſe vegetables are now believed to draw almoſt the whole of their nouriſhment from this ſource. As in them the water is decompoſed, as it is perſpired by them in the ſunſhine, the oxygen gas increaſes the quantity and the purity of the atmoſphere in their vicinity, and the hydrogen ſeems to be retained, and to form the nutritive juices, and conſequent ſecretions of roſin, gum, wax, honey, oil, and other vegetable productions. See Botanic Garden, Part I. Cant. IV. line 25, note. It has however other uſes in the ſyſtem, beſides that of a nouriſhing material, as it dilutes our fluids, and lubricates our ſolids; and on all theſe accounts a daily ſupply of it is required.

2. River-water is in general purer than ſpring-water; as the neutral ſalts waſhed down from the earth decompoſe each other, except perhaps the marine ſalt; and the earths, with which ſpring-water frequently abounds, is precipitated; yet it is not improbable, that the calcareous earth diſſolved in the water of many ſprings may contribute to our nouriſhment, as the water from ſprings, which contain earth, is ſaid to conduce to enrich thoſe lands, which are flooded with it, more than river water.

3. Many arguments ſeem to ſhew, that calcareous earth contributes to the nouriſhment of animals and vegetables. Firſt becauſe calcareous earth conſtitutes a conſiderable part of them, and muſt therefore either be received from without, or formed by them, or both, as milk, when taken as food by a lacteſcent woman, is decompoſed in the ſtomach by the proceſs of digeſtion, and again in part converted into milk by the pectoral glands. Secondly, becauſe from the analogy of all organic life, whatever has compoſed a part of a vegetable or animal may again after its che-

mical ſolution become a part of another vegetable or animal, ſuch is the general tranſmigration of matter. And thirdly, becauſe the great uſe of lime in agriculture on almoſt all kinds of ſoil and ſituation cannot be ſatisfactorily explained from its chemical properties alone. Though theſe may alſo in certain ſoils and ſituations have conſiderable effect.

The chemical uſes of lime in agriculture may be, 1. from its deſtroying in a ſhort time the coheſion of dead vegetable fibres, and thus reducing them to earth, which otherwiſe is effected by a ſlow proceſs either by the conſumption of inſects or by a gradual putrefaction. Thus I am informed that a mixture of lime with oak bark, after the tanner has extracted from it whatever is ſoluble in water, will in two or three months reduce it to a fine black earth, which, if only laid in heaps, would require as many years to effect by its own ſpontaneous fermentation or putrefaction. This effect of lime muſt be particularly advantageous to newly incloſed commons when firſt broken up.

Secondly, lime for many months continues to attract moiſture from the air or earth, which it deprives I ſuppoſe of carbonic acid, and then ſuffers it to exhale again, as is ſeen on the plaſtered walls of new houſes. On this account it muſt be advantageous when mixed with dry or ſandy ſoils, as it attracts moiſture from the air above or the earth beneath, and this moiſture is then abſorbed by the lymphatics of the roots of vegetables. Thirdly, by mixing lime with clays it is

believed

Vide - Murrays Materia
[illegible]

believed to make them leſs coheſive, and thus to admit of their being more eaſily penetrated by vegetable fibres. A mixture of lime with clays deſtroys their ſuperabundancy of acid, if ſuch exiſts, and by uniting with it converts it into gypſum or alabaſter. And laſtly, freſh lime deſtroys worms, ſnails, and other inſects, with which it happens to come in contact.

Yet do not all theſe chemical properties ſeem to account for the great uſes of lime in almoſt all ſoils and ſituations, as it contributes ſo much to the melioration of the crops, as well as to their increaſe in quantity. Wheat from land well limed is believed by farmers, millers, and bakers, to be, as they ſuppoſe, thinner ſkinned; that is, it turns out more and better flour; which I ſuppoſe is owing to its containing more ſtarch and leſs mucilage. In reſpect to graſs-ground I am informed, that if a ſpadeful of lime be thrown on a tuſſock, which horſes or cattle have refuſed to touch for years, they will for many ſucceeding ſeaſons eat it quite cloſe to the ground,

One property of lime is not perhaps yet well underſtood, I mean its producing ſo much heat, when it is mixed with water; which may be owing to the elementary fluid of heat conſolidated in the lime. It is the ſteam occaſioned by this heat, when water is ſprinkled upon lime, if the water be not in too great quantity or too cold, which breaks the lime into ſuch fine powder as almoſt to become fluid, which cannot be effected perhaps by any other means, and which I ſuppoſe muſt give great preference to lime in agriculture, and to the ſolutions of calcareous earth in water, over chalk or powdered limeſtone, when ſpread upon the land.

4. It was formerly believed that waters replete with calcareous earth, ſuch as incruſt the inſide of tea-kettles, or are ſaid to petrify moſs, were liable to produce or to increaſe the ſtone in the bladder. This miſtaken idea has lately been exploded by the improved chemiſtry, as no calcareous earth, or a very minute quantity, was found in the calculi analyſed by Scheele and Bergman. The waters of Matlock and of Carlſbad, both which cover the moſs, which they paſs through, with a calcareous cruſt, are ſo far from increaſing the ſtone of the bladder or kidneys, that thoſe of Carlſbad are celebrated for giving relief to thoſe labouring under theſe diſeaſes. Philoſ. Tranſ. Thoſe of Matlock are drank in great quantities without any ſuſpicion of injury; and I well know a perſon who for above ten years has drank about two pints a day of cold water from a ſpring, which very much incruſts the veſſels, it is boiled in, with calcareous earth, and affords a copious calcareous ſediment with a ſolution of ſalt of tartar, and who enjoys a ſtate of uninterrupted health.

V. 1. As animal bodies conſiſt much both of oxygen and azote, which make up the compoſition of atmoſpheric air, theſe ſhould be counted amongſt nutritious ſubſtances. Beſides that by the experiments of Dr. Prieſtley it appears, that the oxygen gains admittance into the blood through the moiſt membranes of the lungs; and ſeems to be of much more immediate conſequence to the preſervation of our lives than the other kinds of nutriment above ſpecified.

As the baſis of fixed air, or carbonic acid gas, is carbone, which alſo conſtitutes a great part both of vegetable and animal bodies; this air ſhould likewiſe be reckoned amongſt nutritive ſubſtances. Add to this, that when this carbonic acid air is ſwallowed, as it eſcapes from beer or cyder, or when water is charged with it as detruded from limeſtone by vitriolic acid, it affords an agreeable ſenſation both to the palate and ſtomach, and is therefore probably nutritive.

The immenſe quantity of carbone and of oxygen which conſtitute ſo great a part of the limeſtone countries is almoſt beyond conception, and, as it has been formed by animals, may again become a part of them, as well as the calcareous matter with which they are united. Whence it may be conceived, that the waters, which abound with limeſtone in ſolution, may ſupply nutriment both to animals and to vegetables, as mentioned above.

VI. 1. The manner, in which nutritious particles are ſubſtituted in the place of thoſe, which are mechanically abraded, or chemically decompoſed, or which vaniſh by animal abſorption, muſt be owing to animal appetency, as deſcribed in Sect. XXXVII. 3. and is probably ſimilar to the proceſs of inflammation, which produces new veſſels and new fluids; or to that which conſtitutes the growth of the body to maturity. Thus the granulations of new fleſh to repair the injuries of wounds are viſible to the eye; as well as the callous matter, which cements broken bones; the calcareous matter, which repairs injured ſnail-ſhells; and the threads, which are formed by ſilk-worms and ſpiders; which are all ſecreted in a ſofter ſtate, and harden by exſiccation, or by the contact of the air, or by abſorption of their more fluid parts.

Whether the materials, which thus ſupply the waſte of the ſyſtem, can be given any other way than by the ſtomach, ſo as to preſerve the body for a length of time, is worth our inquiry; as caſes ſometimes occur, in which food cannot be introduced into the ſtomach, as in obſtructions of the œſophagus, inflammations of the throat, or in hydrophobia; and other caſes are not unfrequent in which the power of digeſtion is nearly or totally deſtroyed, as in anorexia epileptica, and in many fevers.

In the former of theſe circumſtances liquid nutriment may ſometimes be got into the ſtomach through a flexible catheter; as deſcribed in Claſs III. 1. 1. 15. In the latter many kinds of mild aliment, as milk or broth, have frequently been injected as clyſters, together with a ſmall quantity of opium, as ten drops of the tincture, three or four times a day; to which alſo might be added very ſmall quantities of vinous ſpirit. But theſe, as far as I have obſerved, will not long ſuſtain a perſon, who cannot take any ſuſtenance by the ſtomach.

2. Another mode of applying nutritive fluids might be by extenſive fomentations, or by immerging the whole body in a bath of broth, or of warm milk, which might at the ſame time be coagulated by rennet, or the acid of the calf's ſtomach; broth or whey might thus probably be introduced, in part at leaſt, into the circulation, as a ſolution of nitre is ſaid to have been abſorbed in a pediluvium, which was afterwards diſcovered by the manner in which paper dipped frequently in the urine of the patient and dried, burnt and ſparkled like touch-paper. Great quantity of water is alſo known to be abſorbed by thoſe, who have bathed in the warm bath after exerciſe and abſtinence from liquids. Cleopatra was ſaid to travel with 4000 milch-aſſes in her train, and to bathe every morning in their milk, which ſhe probably might uſe as a coſmetic rather than a nutritive.

3. The transfuſion of blood from another animal into the vein of one, who could take no ſuſtenance by the throat, or digeſt none by the ſtomach, might long continue to ſupport him; and perhaps other nutriment, as milk or mucilage, might be this way introduced into the ſyſtem, but we have not yet ſufficient experiments on this ſubject. See Sect. XXXII. 4. and Claſs I, 2. 3. 25. and Sup. I. 14. 2.

VII. Various kinds of condiments, or ſauces, have been taken along with vegetable or animal food, and have been thought by ſome to ſtrengthen the proceſs of digeſtion and conſequent proceſs of nutrition. Of theſe wine, or other fermented liquors, vinegar, ſalt, ſpices, and muſtard, have been in moſt common uſe, and I believe to the injury of thouſands. As the ſtomach by their violent ſtimulus at length loſes its natural degree of irritability, and indigeſtion is the conſequence; which is attended with flatulency and emaciation. Where any of theſe have been taken ſo long as to induce a habit, they muſt either be continued, but not increaſed; or the uſe of them ſhould be gradually and cautiouſly diminiſhed or diſcontinued, as directed in Sect. XII. 7. 8.

III. Catalogue of the Nutrientia.

I. 1. Veniſon, beef, mutton, hare, gooſe, duck, woodcock, ſnipe, moor-game.

2. Oyſters, lobſters, crabs, ſhrimps, muſhrooms, eel, tench, barbolt, ſmelt, turbot, ſole, turtle.

3. Lamb, veal, ſucking-pig.

4. Turkey, partridge, pheaſant, fowl, eggs.

5. Pike, perch, gudgeon, trout, grayling.

II. Milk, cream, butter, buttermilk, whey, cheeſe.

III. Wheat, barley, oats, peas, potatoes, turnips, carrots, cabbage, aſparagus, artichoke, ſpinach, beet, apple, pear, plumb, apricot, nectarine, peach, ſtrawberry, grape, orange, melon, cucumber, dried figs, raiſins, ſugar, honey. With a great variety of other roots, ſeeds, leaves, and fruits.

IV. Water, river-water, ſpring-water, calcareous earth.

V. Air, oxygene, azote, carbonic acid gas.

VI. Nutritive baths and clyſters, transfuſion of blood.

VII. Condiments.

Art. II.

INCITANTIA.

I. 1. Those things, which increaſe the exertions of all the irritative motions, are termed incitantia. As alcohol, or the ſpirituous part of fermented liquors, opium, and many drugs, which are ſtill eſteemed poiſons, their proper doſes not being aſcertained. To theſe ſhould be added the exhilarating paſſions of the mind, as joy, love; and externally the application of heat, electricity, ether, eſſential oils, friction, and exerciſe.

2. Theſe promote both the ſecretions and abſorptions, increaſe the natural heat, and remove thoſe pains, which originate from the defect of irritative motions, termed nervous pains; and prevent the convulſions conſequent to them. When given internally they induce coſtiveneſs, and deep coloured urine; and by a greater doſe, intoxication, and its conſequences.

II. Observations on the Incitantia.

I. 1. Opium and alcohol increaſe all the ſecretions and abſorptions. The increaſe of the ſecretion of ſenſorial power appears from the violent exertions of drunken people; the ſecretion of ſweat is more certainly excited by opium or wine than by any other medicine; and the increaſe of general heat, which theſe drugs produce, is an evidence of their effect in promoting all the ſecretions; ſince an increaſe of ſecretion is always attended with increaſe of heat in the part, as in hepatic and other inflammations.

2. But as they at the ſame time promote abſorption; thoſe fluids, which are ſecreted into receptacles, as the urine, bile, inteſtinal and pulmonary mucus, have again their thinner parts abſorbed; and hence, though the quantity of ſecreted fluid was increaſed, yet as the abſorption was alſo increaſed, the excretion from theſe receptacles is leſſened; at the ſame time that it is deeper coloured or of thicker conſiſtence, as the urine, alvine feces, and pulmonary mucus. Whereas the perſpiration being ſecreted on the ſurface of the body is viſible in its increaſed quantity, before it can be reabſorbed; whence ariſes that erroneous opinion, that opium increaſes the cutaneous ſecretion, and leſſens all the others.

3. It muſt however be noted, that after evacuations opium ſeems to promote the abſorptions more than the ſecretions; if you except that of the ſenſorial power in the brain, which probably ſuffers no abſorption. Hence its efficacy in reſtraining hæmorrhages, after the veſſels are emptied, by promoting venous abſorption.

4. In ulcers the matter is thickened by the exhibition of opium from the increaſed abſorption of the thinner parts of it; but it is probable, that the whole ſecretion, including the part which is

abſorbed, is increaſed; and hence new fibres are ſecreted along with the matter, and the ulcer fills with new granulations of fleſh. But as no ulcer can heal, till it ceaſes to diſcharge; that is, till the abſorption becomes as great as the excretion; thoſe medicines, which promote abſorption only, are more advantageous for the healing an ulcer after it is filled with new fleſh; as the Peruvian bark internally; with bandages and ſolutions of lead externally.

5. There are many pains which originate from a want of due motion in the part, as thoſe occaſioned by cold; and all thoſe pains which are attended with cold extremities, and are generally termed nervous. Theſe are relieved by whatever excites the part into its proper actions, and hence by opium and alcohol; which are the moſt univerſal ſtimulants we are acquainted with. In theſe caſes the effect of opium is produced, as ſoon as the body becomes generally warm; and a degree of intoxication or ſleep follows the ceſſation of the pain.

Theſe nervous pains (as they are called) frequently return at certain periods of time, and are alſo frequently ſucceeded by convulſions; in theſe caſes if opium removes the pain, the convulſions do not come on. For this purpoſe it is beſt to exhibit it gradually, as a grain every hour, or half hour, till it intoxicates. Here it muſt be noted, that a much leſs quantity will prevent the periods of theſe cold pains, than is neceſſary to relieve them after their acceſs. As a grain and half of opium given an hour before the expected paroxyſm will prevent the cold fit of an intermittent fever, but will not ſoon remove it, when it is already formed. For in the former caſe the uſual or healthy aſſociations or catenations of motion favour the effect of the medicine; in the latter caſe theſe aſſociations or catenations are diſordered, or interrupted, and new ones are formed, which ſo far counteract the effect of the medicine.

When opium has been required in large doſes to eaſe or prevent convulſions, ſome have adviſed the patient to omit the uſe of wine, as a greater quantity of opium might then be exhibited; and as opium ſeems to increaſe abſorption more, and ſecretion leſs, than vinous ſpirit; it may in ſome caſes be uſeful to exchange one for the other; as in diſeaſes attended with too great evacuation, as diarrhœa, and dyſentery, opium may be preferable; on the contrary in tetanus, or locked-jaw, where inflammation of the ſyſtem might be of ſervice, wine may be preferable to opium; ſee Claſs III. 1. 1. 12. I have generally obſerved, that a mixture of ſpirit of wine and warm water, given alternately with the doſes of opium, has ſooneſt and moſt certainly produced that degree of intoxication, which was neceſſary to relieve the patient in the epilepſia doloroſica.

6. There is likewiſe ſome relief given by opium to inflammatory pains, or thoſe from exceſs of motion in the affected part; but with this difference, that

this relief from the pains, and the ſleep, which it occaſions, does not occur till ſome hours after the exhibition of the opium. This requires to be explained; after the ſtimulus of opium or of alcohol ceaſes, as after common drunkenneſs, a conſequent torpor comes on; and the whole habit becomes leſs irritable by the natural ſtimuli. Hence the head-achs, ſickneſs, and languor, on the next day after intoxication, with cold ſkin, and general debility. Now in pains from exceſs of motion, called inflammatory pains, when opium is given, the pain is not relieved, till the debility comes on after the ſtimulus ceaſes to act; for then after the greater ſtimulus of the opium has exhauſted much of the ſenſorial power; the leſs ſtimulus, which before cauſed the pain, does not now excite the part into unnatural action.

In theſe caſes the ſtimulus of the opium firſt increaſes the pain; and it ſometimes happens, that ſo great a torpor follows, as to produce the death or mortification of the affected part; whence the danger of giving opium in inflammatory diſeaſes, eſpecially in inflammation of the bowels; but in general the pain returns with its former violence, when the torpor above mentioned ceaſes. Hence theſe pains attended with inflammation are beſt relieved by copious veneſection, other evacuations, and the claſs of medicines called torpentia.

7. Theſe pains from exceſs of motion are attended with increaſed heat of the whole, or of the affected

part, and a ſtrong quick pulſe; the pains from defect of motion are attended with cold extremities, and a weak pulſe; which is alſo generally more frequent than natural, but not always ſo.

8. Opium and alcohol are the only two drugs, we are much acquainted with, which intoxicate; and by this circumſtance are eaſily diſtinguiſhed from the ſecernentia and ſorbentia. Camphor, and cicuta, and nicotiana, are thought to induce a kind of intoxication; and there are many other drugs of this claſs, whoſe effects are leſs known, or their doſes not aſcertained; as atropa belladonna, hyoſcyamus, ſtramonium, prunus lauroceraſus, meniſpermum, cynogloſſum, ſome fungi, and the water diſtilled from black cherry-ſtones; the laſt of which was once much in uſe for the convulſions of children, and was ſaid to have good effect; but is now improvidently left out of our pharmacopœias. I have known one leaf of the lauroceraſus, ſhred and made into tea, given every morning for a week with no ill conſequence to a weak hyſteric lady, but rather perhaps with advantage.

9. The pernicious effects of a continued uſe of much vinous ſpirit is daily ſeen and lamented by phyſicians; not only early debility, like premature age, but a dreadful catalogue of diſeaſes is induced by this kind of intemperance; as dropſy, gout, leproſy, epilepſy, inſanity, as deſcribed in Botanic Garden, Part II. Canto III. line 357. The ſtronger or leſs diluted the ſpirit is taken, the ſooner it ſeems to deſtroy, as

in dram-drinkers; but ſtill ſooner, when kernels of apricots, or bitter almonds, or laurel-leaf, are infuſed in the ſpirit, which is termed ratafia; as then two poiſons are ſwallowed at the ſame time. And vinegar, as it contains much vinous ſpirit, is probably a noxious part of our diet. And the diſtilled vinegar, which is commonly ſold in the ſhops, is truly poiſonous, as it is generally diſtilled by means of a pewter or leaden alembic-head or worm-tube, and abounds with lead; which any one may detect by mixing with it a ſolution of liver of ſulphur. Opium, when taken as a luxury, not as a medicine, is as pernicious as alcohol; as Baron de Tott relates in his account of the opium-eaters in Turkey.

10. It muſt be obſerved, that a frequent repetition of the uſe of this claſs of medicines ſo habituates the body to their ſtimulus, that their doſe may gradually be increaſed to an aſtoniſhing quantity, ſuch as otherwiſe would inſtantly deſtroy life; as is frequently ſeen in thoſe, who accuſtom themſelves to the daily uſe of alcohol and opium; and it would ſeem, that theſe unfortunate people become diſeaſed as ſoon as they omit their uſual potations; and that the conſequent gout, dropſy, palſy, or pimpled face, occur from the debility occaſioned from the want of accuſtomed ſtimulus, or to ſome change in the contractile fibres, which requires the continuance or increaſe of it. Whence the cautions neceſſary to be obſerved are mentioned in Sect. XII. 7. 8.

11. It is probable, that ſome of the articles in the ſubſequent catalogue do not induce intoxication, though they have been eſteemed to do ſo; as tobacco, hemlock, nux vomica, ſtaviſagria; and on this account ſhould rather belong to other arrangements, as to the ſecernentia, or ſorbentia, or invertentia.

II. 1. Externally the application of heat, as the warm bath, by its ſtimulus on the ſkin excites the excretory ducts of the perſpirative glands, and the mouths of the lymphatics, which open on its ſurface, into greater action; and in conſequence many other irritative motions, which are aſſociated with them. To this increaſed action is added pleaſurable ſenſation, which adds further activity to the ſyſtem; and thus many kinds of pain receive relief from this additional atmoſphere of heat.

The uſe of a warm bath of about 96 or 98 degrees of heat, for half an hour once a day for three or four months, I have known of great ſervice to weak people, and is perhaps the leaſt noxious of all unnatural ſtimuli; which however, like all other great excitement, may be carried to exceſs, as complained of by the ancients. The unmeaning application of the words relaxation and bracing to warm and cold baths has much prevented the uſe of this grateful ſtimulus; and the miſuſe of the term warm-bath, when applied to baths colder than the body, as to thoſe of Buxton and Matlock, and to artificial baths of leſs than 90 degrees of heat, which ought to be termed cold ones, has contributed to miſlead the unwary in their application.

The ſtimulus of wine, or ſpice, or ſalt, increaſes the heat of the ſyſtem by increaſing all or ſome of the ſecretions; and hence the ſtrength is diminiſhed afterwards by the loſs of fluids, as well as by the increaſed action of the fibres. But the ſtimulus of the warm-bath ſupplies heat rather than produces it; and rather fills the ſyſtem by increaſed abſorption, than empties it by increaſed ſecretion; and may hence be employed with advantage in almoſt all caſes of debility with cold extremities, perhaps even in anaſarca, and at the approach of death in fevers. In theſe caſes a bath much beneath 98 degrees, as of 80 or 85, might do injury, as being a cold-bath compared with the heat of the body, though ſuch a bath is generally called a warm one.

The activity of the ſyſtem thus produced by a bath of 98 degrees of heat, or upwards, does not ſeem to render the patients liable to take cold, when they come out of it; for the ſyſtem is leſs inclined to become torpid than before, as the warmth thus acquired by communication, rather than by increaſed action, continues long without any conſequent chillneſs. Which accords with the obſervation of Dr. Fordyce, mentioned in Sup. I. 5. 1. who ſays, that thoſe who are confined ſome time in an atmoſphere of 120 or 130 degrees of heat, do not feel cold or look pale on coming into a temperature of 30 or 40 degrees; which would produce great paleneſs and ſenſation of coldneſs in thoſe, who had been ſome time confined in an atmoſphere of only 86 or 90 degrees of heat. Treatiſe on Simple Fever, p. 168.

Hence heat, where it can be confined on a torpid part along with moiſture, as on a ſcrophulous tumour, will contribute to produce ſuppuration or reſolution. This is done by applying a warm poultice, which ſhould be frequently repeated; or a plaſter of reſin, wax, or fat; or by covering the part with oiled ſilk; both which laſt prevent the perſpirable matter from eſcaping as well as the heat of the part, as theſe ſubſtances repel moiſture, and are bad conductors of heat. Another great uſe of the ſtimulus of heat is by applying it to torpid ulcers, which are generally termed ſcrophulous or ſcorbutic, and are much eaſier inclined to heal, when covered with ſeveral folds of flannel.

Mr. —— had for many months been afflicted with an ulcer in perinæo, which communicated with the urethra, through which a part of his urine was daily evacuated with conſiderable pain; and was reduced to a great degree of debility. He uſed a hot-bath of 96 or 98 degrees of heat every day for half an hour during about ſix months. By this agreeable ſtimulus repeated thus at uniform times not only the ulcer healed, contrary to the expectation of his friends, but he acquired greater health and ſtrength, than he had for ſome years previouſly experienced.

Mrs. —— was affected with tranſient pains, which were called nervous ſpaſms, and with great fear of diſeaſes, which ſhe did not labour under, with cold extremities, and general debility. She uſed a hot-bath every other day of 96 degrees of heat for about four months, and recovered a good ſtate of health, with greater ſtrength and courage, than ſhe had poſſeſſed for many months before.

Mr. Z. a gentleman about 65 years of age, who had lived rather intemperately in reſpect to vinous potation, and had for many years had annual viſits of the gout, which now became irregular, and he appeared to be loſing his ſtrength, and beginning to feel the effects of age. He uſed a bath, as hot as was agreeable to his ſenſations, twice a week for about a year and half, and greatly recovered his health and ſtrength with leſs frequent and leſs violent returns of regular gout, and is now near 80 years of age.

When Dr. Franklin, the American philoſopher, was in England many years ago, I recommended to him the uſe of a warm-bath twice a week to prevent the too ſpeedy acceſs of old age, which he then thought that he felt the approach of, and I have been informed, that he continued the uſe of it till near his death, which was at an advanced age.

All theſe patients were adviſed not to keep themſelves warmer than their uſual habits, after they came out of the bath, whether they went into bed or not; as the deſign was not to promote perſpiration, which weakens all conſtitutions, and ſeldom is of ſervice to any. Thus a flannel ſhirt, particularly if it be worn in warm weather, occaſions weakneſs by ſtimulating the ſkin by its points into too great action, and producing heat in conſequence; and occaſions emaciation by increaſing the diſcharge of perſpirable matter; and in both theſe reſpects differs from the effect of warm bathing, which communicates heat to the ſyſtem at the ſame time that it ſtimulates it, and cauſes abſorption more than exhalation.

2. The effect of the paſſage of an electric ſhock through a paralytic limb in cauſing it to contract, beſides the late experiments of Galvani and Volta on frogs, intitle it to be claſſed amongſt univerſal ſtimulants. Electric ſhocks frequently repeated daily for a week or two remove chronical pains, as the pleurodyne chronica, Claſs I. 2. 4. 14. and other chronic pains, which are termed rheumatic, probably by promoting the abſorption of ſome extravaſated material. Scrophulous tumours are ſometimes abſorbed, and ſometimes brought to ſuppurate by paſſing electric ſhocks through them daily for two or three weeks.

Miſs ——, a young lady about eight years of age, had a ſwelling about the ſize of a pigeon's egg on her neck a little below her ear, which long continued in an indolent ſtate. Thirty or forty ſmall electric ſhocks were paſſed through it once or twice a day for two or three weeks, and it then ſuppurated and healed without difficulty. For this operation the coated jar of the electric machine had on its top an electrometer, which meaſured the ſhocks by the approach of a braſs knob, which communicated with the external coating to another, which communicated with the internal one, and their diſtance was adjuſted by a ſcrew. So that the ſhocks were ſo ſmall as not to alarm the child, and the accumulated electricity was frequently diſcharged, as the wheel continued turning. The tumour was incloſed between two other braſs knobs, which were fixed on wires, which paſſed through glaſs tubes, the tubes were cemented in two grooves on a board, ſo that at one end they were nearer each other than at the other, and the knobs were puſhed out ſo far as exactly to include the tumour, as deſcribed in the annexed plate, which is about half the ſize of the original apparatus.

Inflammations of the eyes without fever are frequently cured by taking a ſtream of very ſmall electric ſparks from them, or giving the electric ſparks to them, once or twice a day for a week or two; that is, the new veſſels, which conſtitute inflammation in theſe inirritable conſtitutions, are abſorbed by the activity of the abſorbents induced by the ſtimulus of the electric aura. For this operation the eaſieſt method is to fix a pointed wire to a ſtick of ſealing wax, or to an inſulating handle of glaſs, one end of this wire communicates with the prime conductor, and the point is approached near the inflamed eye in every direction.

III. Externally the application of ether, and of eſſential oils, as of cloves or cinnamon, ſeem to poſſeſs a general ſtimulating effect. As they inſtantly relieve tooth-ach, and hiccough, when theſe pains are not in violent degree; and camphor in large doſes is ſaid to produce intoxication; this effect however I have not been witneſs to, and have reaſon to doubt.

The manner in which ether and the eſſential oils operate on the ſyſtem when applied externally, is a curious queſtion, as pain is ſo immediately relieved by them, that they muſt ſeem to penetrate by the great fluidity or expanſive property of a part of them, as of their odoriferous exhalation or vapour, and that they thus ſtimulate the torpid part, and not by their being taken up by the abſorbent veſſels, and carried thither by the long courſe of circulation; nor is it probable, that theſe pains are relieved by the ſympathy of the torpid membrane with the external ſkin, which is thus ſtimulated into action; as it does not ſucceed, unleſs it is applied over the pained part. Thus there appears to be three different modes by which extraneous bodies may be introduced into the ſyſtem, beſides that of abſorption. 1ſt. By ethereal tranſition, as heat and electricity; 2d. by chemical attraction, as oxygen; and 3d. by expanſive vapour, as ether and eſſential oils.

IV. The perpetual neceſſity of the mixture of oxygen gas with the blood in the lungs evinces, that it muſt act as a ſtimulus to the ſanguiferous ſyſtem, as the motions of the heart and arteries preſently ceaſe, when animals are immerſed in airs which poſſeſs no oxygen. It may alſo ſubſequently anſwer another important purpoſe, as it probably affords the material for the production of the ſenſorial power; which is ſuppoſed to be ſecreted in the brain or medullary part of the nerves; and that the perpetual demand of this fluid in reſpiration is occaſioned by the ſenſorial power, which is ſuppoſed to be produced from it, being too ſubtile to be long confined in any part of the ſyſtem.

Another proof of the ſtimulant quality of oxygen appears from the increaſed acrimony, which the matter of a common abſceſs poſſeſſes, after it has been expoſed to the air of the atmoſphere, but not before; and probably all other contagious matters owe their fever-producing property to having been converted into acids by their union with oxygen.

As oxygen penetrates the fine moiſt membranes of the air-veſſels of the lungs, and unites with the blood by a chemical attraction, as is ſeen to happen, when blood is drawn into a baſon, the lower ſurface of the craſſamentum is of a very dark red ſo long as it is covered from the air by the upper ſurface, but becomes florid in a ſhort time on its being expoſed to the atmoſphere; the manner of its introduction into the ſyſtem is not probably by animal abſorption but by chemical attraction, in which circumſtance it differs from the fluids before mentioned both of heat and electricity, and of ether and eſſential oils.

As oxygen has the property of paſſing through moiſt animal membranes, as firſt diſcovered by the great Dr. Prieſtley, it is probable it might be of uſe in vibices, and petechiæ in fevers, and in other bruiſes; if the ſkin over thoſe parts was kept moiſt by warm water, and covered with oxygen gas by means of an inverted glaſs, or even by expoſing the parts thus moiſtened to the atmoſphere, as the dark coloured extravaſated blood might thus become florid, and by its increaſe of ſtimulus facilitate its reabſorption.

Two weak patients, to whom I gave oxygen gas in as pure a ſtate as it can eaſily be procured from Exeter manganeſe, and in the quantity of about four gallons a day, ſeemed to feel refreſhed, and ſtronger, and to look better immediately after reſpiring it, and gained ſtrength in a ſhort time. Two others, one of whom laboured under confirmed hydrothorax, and the other under a permanent and uniform difficulty of reſpiration, were not refreſhed, or in any way ſerved by the uſe of oxygen in the above quantity of four gallons a day for a fortnight, which I aſcribed to the inirritability of the diſeaſed lungs. For other caſes the reader is referred to the publications of Dr. Beddoes; Conſiderations on the uſe of factitious Airs, ſold by Johnſon, London.

Its effects would probably have been greater in reſpect to the quantity breathed, if it had been given in a dilute ſtate, mixed with 10 or 20 times its quantity of atmoſpheric air, as otherwiſe much of it returns by expiration without being deprived of its quality, as may be ſeen by the perſon breathing on the flame of a candle, which it enlarges. See the Treatiſe of Dr. Beddoes above mentioned.

V. Thoſe paſſions, which are attended with pleaſurable ſenſation, excite the ſyſtem into increaſed action in conſequence of that ſenſation, as joy, and love, as is ſeen by the fluſh of the ſkin. Thoſe paſſions, which are attended with diſagreeable ſenſation, produce torpor in general by the expence of ſenſorial power occaſioned by inactive pain; unleſs volition be excited in conſequence of the painful ſenſation; and in that caſe an increaſed activity of the ſyſtem occurs; thus paleneſs and coldneſs are the conſequence of fear, but warmth and redneſs are the conſequence of anger.

VI. Beſides the exertions of the ſyſtem occaſioned by increaſed ſtimuli, and conſequent irritation, and by the paſſions of the mind above deſcribed, the increaſed actions occaſioned by exerciſe belong to this article. Theſe may be divided into the actions of the body in conſequence of volition, which is generally termed labour; or ſecondly, in conſequence of agreeable ſenſation, which is termed play or ſport; thirdly, the exerciſe occaſioned by agitation, as in a carriage or on horſeback; fourthly, that of friction, as with a bruſh or hand, ſo much uſed in the baths of Turkey; and laſtly, the exerciſe of ſwinging.

The firſt of theſe modes of exerciſe is frequently carried to great exceſs even amongſt our own labourers, and more ſo under the laſh of ſlavery; ſo that the body becomes emaciated and ſinks under either the preſent hardſhips, or by a premature old age.

The ſecond mode of exerciſe is ſeen in the play of all young animals, as kittens, and puppies, and children; and is ſo neceſſary to their health as well as to their pleaſure, that thoſe children, who are too much confined from it, not only become pale-faced and bloated, with tumid bellies, and conſequent worms, but are liable to get habits of unnatural actions, as twitching of their limbs, or of ſome parts of their countenance; together with an ill-humoured or diſcontented mind.

Agitation in a carriage or on horſeback, as it requires ſome little voluntary exertion to preſerve the body perpendicular, but much leſs voluntary exertion than in walking, ſeems the beſt adapted to invalids; who by theſe means obtain exerciſe principally by the ſtrength of the horſe, and do not therefore too much exhauſt their own ſenſorial power. The uſe of friction with a bruſh or hand, for half an hour or longer morning and evening, is ſtill better adapted to thoſe, who are reduced to extreme debility; as none of their own ſenſorial power is thus expended, and affords ſomewhat like the warm-bath activity without ſelf-exertion, and is uſed as a luxury after warm bathing in many parts of Aſia.

Another kind of exerciſe is that of ſwinging, which requires ſome exertion to keep the body perpendicular, or pointing towards the center of the ſwing, but is at the ſame time attended with a degree of vertigo; and is deſcribed in Claſs II. 1. 6. 7. IV. 2. 1. 10. Sup. I. 3. and 15.

The neceſſity of much exerciſe has perhaps been more inſiſted upon by phyſicians, than nature ſeems to demand. Few animals exerciſe themſelves ſo as to induce viſible ſweat, unleſs urged to it by mankind, or by fear, or hunger. And numbers of people in our market towns, of ladies particularly, with ſmall fortunes, live to old age in health, without any kind of exerciſe of body, or much activity of mind.

In ſummer weak people cannot continue too long in the air, if it can be done without fatigue; and in winter they ſhould go out ſeveral times in a day for a few minutes, uſing the cold air like a cold-bath, to invigorate and render them more hardy.

III. CATALOGUE OF THE INCITANTIA.

1. Papaver ſomniferum; poppy, opium.
   Alcohol, wine, beer, cyder.
   Prunus lauro-ceraſus; laurel, diſtilled water from the leaves.
   Prunus ceraſus; black cherry, diſtilled water from the kernels.
   Nicotiana tabacum; tobacco? the eſſential oil, decoction of the leaf.
   Atropa belladona; deadly nightſhade, the berries.
   Datura ſtramonium; thorn-apple, the fruit boiled in milk.
   Hyoſcyamus reticulatus; henbane, the ſeeds and leaves.
   Cynogloſſum; hounds tongue.

Meniſpermum, cocculus; Indian berry.
Amygdalus amarus; bitter almond.
Cicuta; hemlock. Conium maculatum?
Strychnos nuc vomica?
Delphinium ſtaviſagria?

II. Externally, heat, electricity.

III. Ether, eſſential oils.

IV. Oxygen gas.

V. Paſſions of love, joy, anger.

VI. Labour, play, agitation, friction.

ART. III.

SECERNENTIA.

I. THOSE THINGS which increaſe the irritative motions, which conſtitute ſecretion, are termed ſecernentia; which are as various as the glands, which they ſtimulate into action.

1. Diaphoretics, as aromatic vegetables, eſſential oils, ether, volatile alkali, neutral ſalts, antimonial preparations, external heat, exerciſe, friction, cold water for a time with ſubſequent warmth, bliſters, electric fluid.

2. Sialagogues, as mercury internally, and pyrethrum externally.

3. Expectorants, as ſquill, onions, gum ammoniac, ſeneka root, mucilage: ſome of theſe increaſe the pulmonary perſpiration, and perhaps the pulmonary mucus.

4. Diuretics, as neutral ſalts, fixed alkali, balſams, reſins, aſparagus, cantharides.

5. Cathartics of the mild kind, as ſenna, jalap, neutral ſalts, manna. They increaſe the ſecretions of bile, pancreatic juice, and inteſtinal mucus.

6. The mucus of the bladder is increaſed by cantharides, and perhaps by oil of turpentine.

7. The mucus of the rectum by aloe internally, by clyſters and ſuppoſitories externally.

8. The mucus of the cellular membrane is increaſed by bliſters and ſinapiſms.

9. The mucus of the noſtrils is increaſed by errhines of the milder kind, as marum, common ſnuff.

10. The ſecretion of tears is increaſed by volatile ſalts, the vapour of onions, by grief, and joy.

11. All thoſe medicines increaſe the heat of the body, and remove thoſe pains, which originate from a defect of motion in the veſſels, which perform ſecretion; as pepper produces a glow on the ſkin, and balſam of Peru is ſaid to relieve the flatulent cholic. But theſe medicines differ from the preceding claſs, as they neither induce coſtiveneſs nor deep coloured urine in their uſual doſe, nor intoxication in any doſe.

12. Yet if any of theſe are uſed unneceſſarily, it is obvious, like the incitantia, that they muſt contribute to ſhorten our lives by ſooner rendering peculiar parts of the ſyſtem diſobedient to their natural ſtimuli. Of thoſe in daily uſe the great exceſs of common ſalt is probably the moſt pernicious, as it enters all our

cookery,

cookery, and is probably one cauſe of ſcrophula, and of ſea-ſcurvy, when joined with other cauſes of debility. See Botanic Garden, Part II. Canto IV. line 221. Spices taken to exceſs by ſtimulating the ſtomach, and the veſſels of the ſkin by aſſociation, into unneceſſary action, contribute to weaken theſe parts of the ſyſtem, but are probably leſs noxious than the general uſe of ſo much ſalt.

II. OBSERVATIONS ON THE SECERNENTIA.

I. 1. Some of the medicines of this claſs produce abſorption in ſome degree, though their principal effect is exerted on the ſecerning part of our ſyſtem. We ſhall have occaſion to obſerve a ſimilar circumſtance in the next claſs of medicines termed Sorbentia; as of theſe ſome exert their effects in a ſmaller degree on the ſecerning ſyſtem. Nor will this ſurpriſe any one, who has obſerved, that all natural objects are preſented to us in a ſtate of combination; and that hence the materials, which produce theſe different effects, are frequently found mingled in the ſame vegetable. Thus the pure aromatics increaſe the action of the veſſels, which ſecrete the perſpirable matter; and the pure aſtringents increaſe the action of the veſſels, which abſorb the mucus from the lungs, and other cavities of the body; hence it muſt happen, that nutmeg, which poſſeſſes both theſe qualities, ſhould have the double effect above mentioned.

Other drugs have this double effect, and belong either to the claſs of Secernentia or Sorbentia, according to the doſe in which they are exhibited. Thus a ſmall doſe of alum increaſes abſorption, and induces coſtiveneſs; and a large one increaſes the ſecretions into the inteſtinal canal, and becomes cathartic. And this accounts for the conſtipation of the belly left after the purgative quality of rhubarb ceaſes, for it increaſes abſorption in a ſmaller doſe, and ſecretion in a greater. Hence when a part of the larger doſe is carried out of the habit by ſtools, the ſmall quantity which remains induces coſtiveneſs. Hence rhubarb exhibited in ſmall doſes, as 2 or 3 grains twice a day, ſtrengthens the ſyſtem by increaſing the action of the abſorbent veſſels, and of the inteſtinal canal.

2. Diaphoretics. The perſpiration is a ſecretion from the blood in its paſſage through the capillary veſſels, as other ſecretions are produced in the termination of the arteries in the various glands. After this ſecretion the blood loſes its florid colour, which it regains in its paſſage through the lungs; which evinces that ſomething beſides water is ſecreted on the ſkins of animals.

No ſtatical experiments can aſcertain the quantity of our perſpiration; as a continued abſorption of the moiſture of the atmoſphere exiſts at the ſame time both by the cutaneous and pulmonary lymphatics.

3. Every gland is capable of being excited into greater exertions by an appropriated ſtimulus applied

either by its mixture with the blood immediately to the ſecerning veſſel, or applied externally to its excretory duct. Thus mercury internally promotes an increaſed ſalivation, and pyrethrum externally applied to the excretory ducts of the ſalival glands. Aloes ſtimulate the rectum internally mixed with the circulating blood; and ſea-ſalt by injection externally. Now as the capillaries, which ſecrete the perſpirable matter, lie near the ſurface of the body, the application of external heat acts immediately on their excretory ducts, and promotes perſpiration; internally thoſe drugs which poſſeſs a fragrant eſſential oil, or ſpiritus rector, produce this effect, as the aromatic vegetables, of which the number is very great.

4. It muſt be remembered, that a due quantity of ſome aqueous vehicle muſt be given to ſupport this evacuation; otherwiſe a burning heat without much viſible ſweat muſt be the conſequence. When the ſkin acquires a degree of heat much above 108, as appears by Dr. Alexander's experiments, no viſible ſweat is produced; which is owing to the great heat of the ſkin evaporating it as haſtily, as it is ſecreted; and, where the ſweat is ſecreted in abundance, its evaporation cannot carry off the exuberant heat, like the vapour of boiling water; becauſe a great part o it is wiped off, or abſorbed by the bed-clothes; o the air about the patient is not changed ſufficiently often, as it becomes ſaturated with the perſpirabl matter. And hence it is probable, that the waſte o perſpirable matter is as great, or greater, when th

ſkin is hot and dry, as when it ſtands in drops on the ſkin; as appears from the inextinguiſhable thirſt.

Hence Dr. Alexander found, that when the heat of the body was greater than 108, nothing produced ſweats but repeated draughts of cold water; and of warm fluids, when the heat was much below that degree. And that cold water which procured ſweats inſtantaneouſly when the heat was above 108, ſtopped them as certainly when it was below that heat; and that flannels, wrung out of warm water and wrapped round the legs and thighs, were then moſt certainly productive of ſweats.

5. The diaphoretics are all ſaid to ſucceed much better, if given early in the morning, about an hour before ſun-riſe, than at any other time; which is owing to the great excitability of every part of the ſyſtem after the ſenſorial power has been accumulated during ſleep. In thoſe, who have hectic fever, or the febricula, or nocturnal fever of debility, the morning ſweats are owing to the decline of the fever-fit, as explained in Sect. XXXII. 9. In ſome of theſe patients the ſweat does not occur till they awake; becauſe then the ſyſtem is ſtill more excitable than during ſleep, becauſe the aſſiſtance of the voluntary power in reſpiration facilitates the general circulation. See Claſs I. 2. 1. 3.

6. It muſt be obſerved, that the ſkin is very dry and hard to the touch, where the abſorbents, which

open on its ſurface, do not act; as in ſome dropſies, and other diſeaſes attended with great thirſt. This dryneſs, and ſhrivelled appearance, and roughneſs, are owing to the mouths of the abſorbents being empty of their accuſtomed fluid, and is diſtinguiſhable from the dryneſs of the ſkin above mentioned in the hot fits of fever, by its not being attended with heat.

As the heat of the ſkin in the uſual temperature of the air always evinces an increaſed perſpiration, whether viſible or not, the heat being produced along with the increaſe of ſecretion; it follows, that a defect of perſpiration can only exiſt, when the ſkin is cold.

7. Volatile alkali is a very powerful diaphoretic, and particularly if exhibited in wine-whey; 20 drops of ſpirit of hartſhorn every half hour in half a pint of wine-whey, if the patient be kept in a moderately warm bed, will in a few hours elicit moſt profuſe ſweats.

Neutral ſalts promote inviſible perſpiration, when the ſkin is not warmed much externally, as is evinced from the great thirſt, which ſucceeds a meal of ſalt proviſions, as of red herrings. When theſe are ſufficiently diluted with water, and the ſkin kept warm, copious ſweats without inflaming the habit, are the conſequence. Half an ounce of vinegar ſaturated with volatile alkali, taken every hour or two hours, well anſwers this purpoſe; and is preferable perhaps in general to all others, where ſweating is advantageous. Boerhaave mentions one cured of a fever by eating red-herrings or anchovies, which, with repeated draughts of warm water or tea, would I ſuppoſe produce copious perſpiration.

Antimonial preparations have alſo been of late much uſed with great advantage in diaphoretics. For the hiſtory and uſe of theſe preparations I ſhall refer the reader to the late writers on the Materia Medica, only obſerving that the ſtomach becomes ſo ſoon habituated to its ſtimulus, that the ſecond doſe may be conſiderably increaſed, if the firſt had no operation.

Where it is adviſable to procure copious ſweats, the emetics, as ipecacuanha, joined with opiates, as in Dover's powder, produce this effect with greater certainty than the above.

8. We muſt not diſmiſs this ſubject without obſerving, that perſpiration is deſigned to keep the ſkin flexile, as the tears are intended to clean and lubricate the eye; and that neither of theſe fluids can be conſidered as excretions in their natural ſtate, but as ſecretions. See Claſs I. 1. 2. 3. And that therefore the principal uſe of diaphoretic medicines is to warm the ſkin, and thence in conſequence to produce the natural degree of inſenſible perſpiration in languid habits.

9. When the ſkin of the extremities is cold, which is always a ſign of preſent debility, the digeſtion becomes frequently impaired by aſſociation, and car-

dialgia or heartburn is induced from the vinous or acetous fermentation of the aliment. In this diſeaſe diaphoretics, which have been called cordials, by their action on the ſtomach reſtore its exertion, and that of the cutaneous capillaries by their aſſociation with it, and the ſkin becomes warm, and the digeſtion more vigorous.

10. But a bliſter acts with more permanent and certain effect by ſtimulating a part of the ſkin, and thence affecting the whole of it, and of the ſtomach by aſſociation, and thence removes the moſt obſtinate heartburns and vomitings. From this the principal uſe of bliſters is underſtood, which is to invigorate the exertions of the arterial and lymphatic veſſels of the ſkin, producing an increaſe of inſenſible perſpiration, and of cutaneous abſorption; and to increaſe the action of the ſtomach, and the conſequent power of digeſtion; and thence by ſympathy to excite all the other irritative motions: hence they relieve pains of the cold kind, which originate from defect of motion; not from their introducing a greater pain, as ſome have imagined, but by ſtimulating the torpid veſſels into their uſual action; and thence increaſing the action and conſequent warmth of the whole ſkin, and of all the parts which are aſſociated with it.

II. 1. *Sialagogues.* The preparations of mercury conſiſt of a ſolution or corroſion of that metal by ſome acid; and, when the doſe is known, it is probable that they are all equally efficacious. As their principal uſe is in the cure of the venereal diſeaſe, they will be mentioned in the catalogue amongſt the ſorbentia. Where ſalivation is intended, it is much forwarded by a warm room and warm clothes; and prevented by expoſing the patient to his uſual habits of cool air and dreſs, as the mercury is then more liable to go off by the bowels.

2. Any acrid drug, as pyrethrum, held in the mouth acts as a ſialagogue externally by ſtimulating the excretory ducts of the ſalivary glands; and the ſiliqua hirſuta applied externally to the parotid gland, and even hard ſubſtances in the ear, are ſaid to have the ſame effect. Maſtich chewed in the mouth emulges the ſalivary glands.

3. The unwiſe cuſtom of chewing and ſmoaking tobacco for many hours in a day not only injures the ſalivary glands, producing dryneſs in the mouth when this drug is not uſed, but I ſuſpect that it alſo produces ſchirrhus of the pancreas. The uſe of tobacco in this immoderate degree injures the power of digeſtion, by occaſioning the patient to ſpit out that ſaliva, which he ought to ſwallow; and hence produces that flatulency, which the vulgar unfortunately take it to prevent. The mucus, which is brought from the fauces by hawking, ſhould be ſpit out, as well as that coughed up from the lungs; but that which comes ſpontaneouſly into the mouth from the ſalivary glands,

ſhould be ſwallowed mixed with our food or alone for the purpoſes of digeſtion. See Claſs I. 2. 2. 7.

III. 1. Expectorants are ſuppoſed to increaſe the ſecretion of mucus in the branches of the windpipe, or to increaſe the perſpiration of the lungs ſecreted at the terminations of the bronchial artery.

2. If any thing promotes expectoration toward the end of peripneumonies, when the inflammation is reduced by bleeding and gentle cathartics, ſmall repeated bliſters about the cheſt, with tepid aqueous and mucilaginous or oily liquids, are more advantageous than the medicines generally enumerated under this head; the bliſters by ſtimulating into action the veſſels of the ſkin produce by aſſociation a greater activity of thoſe of the mucous membrane, which lines the branches of the wind-pipe, and air-cells of the lungs; and thus after evacuation they promote the abſorption of the mucus and conſequent healing of the inflamed membrane, while the diluting liquids prevent this mucus from becoming too viſcid for this purpoſe, or facilitate its expuition.

Bliſters, one at a time, on the ſides or back, or on the ſternum, are alſo uſeful towards the end of peripneumonies, by preventing the evening acceſs of cold fit, and thence preventing the hot fit by their ſtimulus on the ſkin; in the ſame manner as five drops of laudanum by its ſtimulus on the ſtomach. For the increaſed actions of the veſſels of the ſkin or ſtomach excite a greater quantity of the ſenſorial power of aſſociation, and thus prevent the torpor of the other parts of the ſyſtem; which, when patients are debilitated, is ſo liable to return in the evening.

3. Warm bathing is of great ſervice towards the end of peripneumony to promote expectoration, eſpecially in thoſe children who drink too little aqueous fluids, as it gently increaſes the action of the pulmonary capillaries by their conſent with the cutaneous ones, and ſupplies the ſyſtem with aqueous fluid, and thus dilutes the ſecreted mucus.

Some have recommended oil externally around the cheſt, as well as internally, to promote expectoration; and upon the noſe, when its mucous membrane is inflamed, as in common catarrh.

IV. 1. Diuretics. If the ſkin be kept warm, moſt of theſe medicines promote ſweat inſtead of urine; and if their doſe is enlarged, moſt of them become cathartic. Hence the neutral ſalts are uſed in general for all theſe purpoſes. Thoſe indeed, which are compoſed of the vegetable acid, are moſt generally uſed as ſudorifics; thoſe with the nitrous acid as diuretics; and theſe with the vitriolic acid as cathartics: while thoſe united with the marine acid enter our common nutriment, as a more general ſtimulus. All theſe increaſe the acrimony of the urine, hence it is retained a leſs time in the bladder; and in conſequence leſs of it is reabſorbed into the ſyſtem, and the apparent quantity is greater, as more is evacuated from the bladder; but it is not certain from thence, that a greater quantity is ſecreted by the kidneys. Hence nitre, and other neutral ſalts, are erroneouſly given in the gonorrhœa; as they augment the pain of making water by their ſtimulus on the excoriated or inflamed urethra. They are alſo erroneouſly given in catarrhs or coughs, where the diſcharge is too thin and ſaline, as they increaſe the frequency of coughing.

2. Balſam of Copaiva is thought to promote urine more than the other native balſams; and common reſin is ſaid to act as a powerful diuretic in horſes. Theſe are alſo much recommended in gleets, and in fluor albus, perhaps more than they deſerve; they give a violet ſmell to the urine, and hence probably increaſe the ſecretion of it.

Calcined egg-ſhells are ſaid to promote urine, perhaps from the phoſphoric acid they contain.

3. Cold air and cold water will increaſe the quantity of urine by decreaſing the abſorption from the bladder; and neutral and alkalious ſalts and cantharides by ſtimulating the neck of the bladder; to diſcharge the urine as ſoon as ſecreted; and alcohol as gin and rum at the beginning of intoxication, if the body be kept cool, occaſion much urine by inverting the urinary lymphatics, and thence pouring a fluid into the bladder, which never paſſed the kidneys. But it is

probable, that thoſe medicines, which give a ſcent to the urine, as the balſams and reſins, but particularly aſparagus and garlic, are the only drugs, which truly increaſe the ſecretion of the kidneys. Alcohol however, uſed as above mentioned, and perhaps great doſes of tincture of cantharides, may be conſidered as draſtic diuretics, as they pour a fluid into the bladder by the retrograde action of the lymphatics, which are in great abundance ſpread about the neck of it. See Sect. XXIX. 3.

V. Mild cathartics. The ancients believed that ſome purges evacuated the bile, and hence were termed Cholagogues; others the lymph, and were termed Hydragogues; and that in ſhort each cathartic ſelected a peculiar humour, which it diſcharged. The moderns have too haſtily rejected this ſyſtem; the ſubject well deſerves further obſervation.

Calomel given in the doſe from ten to twenty grains, ſo as to induce purging without the aſſiſtance of other drugs, appears to me to particularly increaſe the ſecretion of bile, and to evacuate it; aloe ſeems to increaſe the ſecretion of the inteſtinal mucus; and it is probable that the pancreas and ſpleen may be peculiarly ſtimulated into action by ſome other of this tribe of medicines; whilſt others of them may ſimply ſtimulate the inteſtinal canal to evacuate its contents, as the bile of animals. It muſt be remarked, that all theſe cathartic medicines are ſuppoſed to be exhibited in their uſual doſes, otherwiſe they become draſtic purges, and are treated of in the Claſs of Invertentia.

VI. The mucus of the bladder is ſeen in the urine, when cantharides have been uſed, either internally or externally, in ſuch doſes as to induce the ſtrangury. Spirit of turpentine is ſaid to have the ſame effect. I have given above a dram of it twice a day floating on a glaſs of water in chronic lumbago without this effect, and the patient gradually recovered.

VII. Aloe given internally ſeems to act chiefly on the rectum and ſphincter ani, producing teneſmus and piles. Externally in clyſters or ſuppoſitories, common ſalt ſeems to act on that bowel with greater certainty. But where the thread-worm or aſcarides exiſt, 60 or 100 grains of aloes reduced to powder and boiled in a pint of gruel, and uſed as a clyſter twice a week for three months, has frequently deſtroyed them.

VIII. The external application of cantharides by ſtimulating the excretory ducts of the capillary glands produces a great ſecretion of ſubcutaneous mucus with pain and inflammation; which mucaginous fluid, not being able to permeate the cuticle, raiſes it up; a ſimilar ſecretion and elevation of the cuticle is produced by actual fire; and by cauſtic materials, as by the application of the juice of the root of white briony, or bruiſed muſtard-ſeed. Experiments are wanting to introduce ſome acrid application into practice inſtead of cantharides, which might not induce the ſtrangury.

Muſtard-ſeed alone is too acrid, and if it be ſuffered to lie on the ſkin many minutes is liable to produce a ſlough and conſequent ulcer, and ſhould therefore be mixed with flour when applied to cold extremities. Volatile alkali properly diluted might ſtimulate the ſkin without inducing ſtrangury.

IX. The mild errhines are ſuch as moderately ſtimulate the membrane of the noſtrils, ſo as to increaſe the ſecretion of the naſal mucus; as is ſeen in thoſe, who are habituated to take ſnuff. The ſtronger errhines are mentioned in Art. V. 2. 3.

X. The ſecretion of tears is increaſed either by applying acrid ſubſtances to the eye; or acrid vapours, which ſtimulate the excretory duct of the lacrymal gland; or by applying them to the noſtrils, and ſtimulating the excretory duct of the lacrymal ſack, as treated of in the Section on Inſtinct.

Or the ſecretion of tears is increaſed by the aſſociation of the motions of the excretory duct of the lacrymal ſack with ideas of tender pleaſure, or of hopeleſs diſtreſs, as explained in Sect. XVI. 8. 2. and 3.

XI. The ſecretion of ſenſorial power in the brain, is probably increaſed by opium or wine, becauſe when taken in certain quantity an immediate increaſe of ſtrength and activity ſucceeds for a time, with conſequent debility if the quantity taken be ſo great as to intoxicate in the leaſt degree. The neceſſity of perpetual reſpiration ſhews, that the oxygen of the atmoſphere ſupplies the ſource of the ſpirit of animation; which is conſtantly expended, and is probably too fine to be long contained in the nerves after its production in the brain. Whence it is probable, that the reſpiration of oxygen gas mixed with common air may increaſe the ſecretion of ſenſorial power; as indeed would appear from its exhilarating effect on moſt patients.

III. Catalogue of the Secernentia.

I. Diaphoretics.

1. Amomum zinziber, ginger. Caryophyllus aromaticus, cloves. Piper indicum, pepper. Capſicum. Cardamomum. Pimento, myrtus pimenta. Canella alba. Serpentaria virginiana, ariſtolochia ſerpentaria, guaiacum. Saſſafras, laurus ſaſſafras. Opium. Wine.
2. Eſſential oils of cinnamon, laurus cinnamomum. Nutmeg, myriſtica moſchata. Cloves, caryophyllus aromaticus. Mint, mentha. Camphor, laurus camphora. Ether.
3. Volatile ſalts, as of ammoniac and of hartſhorn. Sal cornu cervi.

4. Neutral ſalts, as thoſe with vegetable acid; or with marine acid, as common ſalt. Halex. Red-herring, anchovy.
5. Preparations of antimony, as emetic tartar, antimonium tartarizatum, wine of antimony. James's powder.
6. External applications. Bliſters. Warm bath. Warm air. Exerciſe. Friction.
7. Cold water with ſubſequent warmth.

II. Sialagogues. Preparations of mercury, hydrargyrus. Pyrethrum, anthemis pyrethrum, tobacco, cloves, pepper, cowhage, ſtizolobium ſiliqua hirſuta. Maſtich, piſtacia lentiſcus.

III. Expectorants.

1. Squill, ſcilla maritima, garlic, leek, onion, allium, aſafœtida, ferula aſafœtida, gum ammoniac, benzoin, tar, pix liquida, balſam of Tolu.
2. Root of ſeneka, polygala ſeneka, of elicampane, inula helenium.
3. Marſh-mallow, althæa, coltsfoot, tuſſilago farfara, gum arabic, mimoſa nilotica, gum tragacanth, aſtragalus tragacantha. Decoction of barley, hordeum diſtichon. Expreſſed oils. Spermaceti, ſoap. Extract of liquorice, glycyrrhiza glabra. Sugar. Honey.

4. Externally bliſters. Oil. Warm bath.

IV. Mild diuretics.
1. Nitre, kali acetatum, other neutral ſalts.
2. Fixed alkali, ſoap, calcined egg-ſhells.
3. Turpentine. Balſam of Copaiva. Reſin. Olibanum.
4. Aſparagus, garlic, wild daucus. Parſley, apium. Fennel fæniculum, pareira brava, Ciſſampelos?
5. Externally cold air, cold water.
6. Alcohol. Tincture of cantharides. Opium.

V. Mild cathartics.
1. Sweet ſubacid fruits. Prunes, prunus domeſtica. Caſſia fiſtula. Tamarinds, cryſtals of tartar, unrefined ſugar. Manna. Honey.
2. Whey of milk, bile of animals.
3. Neutral ſalts as Glauber's ſalt, vitriolated tartar, ſea-water, magneſia alba, ſoap.
4. Gum guaiacum. Balſam of Peru. Oleum ricini, caſtor-oil, oil of almonds, oil of olives, ſulphur.
5. Senna, caſſia ſenna, jalap, aloe, rhubarb, rheum palmatum.
6. Calomel. Emetic tartar, antimonium tartarizatum.

VI. Secretion of mucus of the bladder is increaſed by cantharides, by ſpirit of turpentine?

VII. Secretion of mucus of the rectum is increaſed by aloe internally, by various clyſters and ſuppoſitories externally.

VIII. Secretion of ſubcutaneous mucus is increaſed by bliſters of cantharides, by application of a thin ſlice of the freſh root of white briony, by ſinapiſms, by root of horſe-radiſh, cochlearia armoracia. Volatile alkali.

IX. Mild errhines. Marjoram. Origanum. Marum, tobacco.

X. Secretion of tears is increaſed by vapour of ſliced onion, of volatile alkali. By pity, or ideas of hopeleſs diſtreſs.

XI. Secretion of ſenſorial power in the brain is probably increaſed by opium, by wine, and perhaps by oxygen gas added to the common air in reſpiration.

Art. IV.

SORBENTIA.

I. Those things which increaſe the irritative motions, which conſtitute abſorption, are termed ſorbentia; and are as various as the abſorbent veſſels, which they ſtimulate into action.

1. Cutaneous abſorption is increaſed by auſtere acids, as of vitriol; hence they are believed to check colliquative ſweats, and to check the eruption of ſmall-pox, and contribute to the cure of the itch, and tinea; hence they thicken the ſaliva in the mouth, as lemon-juice, crab-juice, ſloes.

2. Abſorption from the mucous membrane is increaſed by opium, and Peruvian bark, internally; and by blue vitriol externally. Hence the expectoration in coughs, and the mucous diſcharge from the urethra, are thickened and leſſened.

3. Abſorption from the cellular membrane is promoted by bitter vegetables, and by emetics, and cathartics. Hence matter is thickened and leſſened in ulcers by opium and Peruvian bark; and ſerum is abſorbed in anaſarca by the operation of emetics and cathartics.

4. Venous abſorption is increaſed by acrid vegetables; as water-creſs, cellery, horſe-radiſh, muſtard. Hence their uſe in ſea-ſcurvy, the vibices of which

are owing to a defect of venous abſorption; and by external ſtimulants, as vinegar, and by electricity, and perhaps by oxygen.

5. Inteſtinal abſorption is increaſed by aſtringent vegetables, as rheubarb, galls; and by earthy ſalts, as alum; and by argillaceous and calcareous earth.

6. Hepatic abſorption is increaſed by metallic ſalts, hence calomel and ſal martis are ſo efficacious in jaundice, worms, chloroſis, dropſy.

7. Venereal virus in ulcers is abſorbed by the ſtimulus of mercury; hence they heal by the uſe of this medicine.

8. Veneſection, hunger, thirſt, and violent evacuations, increaſe all abſorptions; hence ſweating produces coſtiveneſs.

9. Externally bitter aſtringent vegetables, earthy and metallic ſalts, and bandages, promote the abſorption of the parts on which they are applied.

10. All theſe in their uſual doſes do not increaſe the natural heat; but they induce coſtiveneſs, and deep coloured urine with earthy ſediment.

In greater doſes they invert the motions of the ſtomach and lacteals; and hence vomit or purge, as carduus benedictus, rhubarb. They promote perſpiration, if the ſkin be kept warm; as camomile tea, and teſtaceous powders, have been uſed as ſudorifics.

The preparations of antimony vomit, purge, or ſweat, either according to the quantity exhibited, or as a part of what is given is evacuated. Thus a quarter of a grain of emetic tartar (if well prepared) will promote a diaphoreſis, if the ſkin be kept warm; half a grain will procure a ſtool or two firſt, and ſweating afterwards; and a grain will generally vomit, and then purge, and laſtly ſweat the patient. In leſs quantity it is probable, that this medicine acts like other metallic ſalts, as ſteel, zinc, or copper in ſmall doſes; that is, that it ſtrengthens the ſyſtem by its ſtimulus. As camomile or rhubarb in different doſes vomit, or purge, or act as ſtimulants ſo as to ſtrengthen the ſyſtem.

II. OBSERVATIONS ON THE SORBENTIA.

I. 1. As there is great difference in the apparent ſtructure of the various glands, and of the fluids which they ſelect from the blood, theſe glands muſt poſſeſs different kinds of irritability, and are therefore ſtimulated into ſtronger or unnatural actions by different articles of the materia medica, as ſhewn in the ſecernentia. Now as the abſorbent veſſels are likewiſe glands, and drink up or ſelect different fluids, as chyle, water, mucus, with a part of every different ſecretion, as a part of the bile, a part of the ſaliva, a part of the urine, &c. it appears, that theſe abſorbent veſſels muſt likewiſe poſſeſs different kinds of irritability, and in conſequence muſt require different articles of the materia medica to excite them into unuſual action. This part of the ſubject has been ſo little attended to, that the candid reader will find in this article a great deal to excuſe.

It was obſerved, that ſome of the ſecernentia did in a leſs degree increaſe abſorption, from the combination of different properties in the ſame vegetable body; for the ſame reaſon ſome of the claſs of ſorbentia produce ſecretion in a leſs degree, as thoſe bitters which have alſo an aroma in their compoſition; theſe are known from their increaſing the heat of the ſyſtem above its uſual degree.

It muſt alſo be noted, that the actions of every part of the abſorbent ſyſtem are ſo aſſociated with each other, that the drugs which ſtimulate one branch increaſe the action of the whole; and the torpor or quieſcence of one branch weakens the exertions of the whole; or when one branch is excited into ſtronger action, ſome other branch has its actions weakened or inverted. Yet though peculiar branches of the abſorbent ſyſtem are ſtimulated into action by peculiar ſubſtances, there are other ſubſtances which ſeem to ſtimulate the whole ſyſtem, and that without immediately increaſing any of the ſecretions; as thoſe bitters which poſſeſs no aromatic ſcent, at the head of which ſtands the famed Peruvian bark, or cinchona.

2. Cutaneous abſorption. I have heard of ſome experiments, in which the body was kept cold, and was thought to abſorb more moiſture from the atmoſphere than at any other time. This however

cannot be determined by ſtatical experiments; as the capillary veſſels, which ſecrete the perſpirable matter, muſt at the ſame time have been benumbed by the cold; and from their inaction there could not have been the uſual waſte of the weight of the body; and as all other muſcular exertions are beſt performed, when the body poſſeſſes its uſual degree of warmth, it is concluſive, that the abſorbent ſyſtem ſhould likewiſe do its office beſt, when it is not benumbed by external cold.

The auſtere acids, as of vitriol, lemon-juice, juice of crabs and ſloes, ſtrengthen digeſtion, and prevent that propenſity to ſweat ſo uſual to weak convaleſcents, and diminiſh the colliquative ſweats in hectic fevers; all which are owing to their increaſing the action of the external and internal cutaneous abſorption. Hence vitriolic acid is given in the ſmall-pox to prevent the too haſty or too copious eruption, which it effects, by increaſing the cutaneous abſorption. Vinegar, from the quantity of alcohol which it contains, exerts a contrary effect to that here deſcribed, and belongs to the incitantia; as an ounce of it promotes ſweat, and a fluſhing of the ſkin; at the ſame time externally it acts as a venous abſorbent, as the lips become pale by moiſtening them with it. And it is ſaid, when taken internally in great and continued quantity, to induce paleneſs of the ſkin, and ſoftneſs of the bones.

The ſweet vegetable acids, as of ſeveral ripe fruits, are among the torpentia; as they are leſs ſtimulating than the general food of this climate, and are hence uſed in inflamatory diſeaſes.

Where the quantity of fluids in the ſyſtem is much leſſened, as in hectic fever, which has been of ſome continuance, or in ſpurious peripneumony, a grain of opium given at night will ſometimes prevent the appearance of ſweats; which is owing to the ſtimulus of opium increaſing the actions of the cutaneous abſorbents, more than thoſe of the ſecerning veſſels of the ſkin. Whence the ſecretion of perſpirable matter is not decreaſed, but its appearance on the ſkin is prevented by its more facile abſorption.

3. There is one kind of itch, which ſeldom appears between the fingers, is the leaſt infectious, and moſt difficult to eradicate, and which has its cure much facilitated by the internal uſe of acid of vitriol. This diſeaſe conſiſts of ſmall ulcers in the ſkin, which are healed by whatever increaſes the cutaneous abſorption. The external application of ſulphur, mercury, and acrid vegetables, acts on the ſame principle; for the animalcula, which are ſeen in theſe puſtules, are the effect, not the cauſe, of them; as all other ſtagnating animal fluids, as the ſemen itſelf, abounds with ſimilar microſcopic animals.

4. Young children have ſometimes an eruption upon the head called Tinea, which diſcharges an acrimonious ichor inflaming the parts on which it falls. This eruption I have ſeen ſubmit to the internal uſe of vitriolic acid, when only wheat-flour

was applied externally. This kind of eruption is likewiſe frequently cured by teſtaceous powders; two materials ſo widely different in their chemical properties, but agreeing in their power of promoting cutaneous abſorption.

II. Abſorption from the mucous membrane is increaſed by applying to its ſurface the auſtere acids, as of vitriol, lemon-juice, crab-juice, ſloes. When theſe are taken into the mouth, they immediately thicken, and at the ſame time leſſen the quantity of the ſaliva; which laſt circumſtance cannot be owing to their coagulating the ſaliva, but to their increaſing the abſorption of the thinner parts of it. So alum applied to the tip of the tongue does not ſtop in its action there, but independent of its diffuſion it induces coheſion and corrugation over the whole mouth. (Cullen's Mat. Med. Art. Aſtringentia.) Which is owing to the aſſociation of the motions of the parts or branches of the abſorbent ſyſtem with each other.

Abſorption from the mucous membrane is increaſed by opium taken internally in ſmall doſes more than by any other medicine, as is ſeen in its thickening the expectoration in coughs, and the diſcharge from the noſtrils in catarrh, and perhaps the diſcharge from the urethra in gonorrhœa. The bark ſeems next in power for all theſe purpoſes.

Externally ſlight ſolutions of blue vitriol, as two or three grains to an ounce of water, applied to ulcers of the mouth or to chancres on the glans penis, more powerfully induces them to heal than any other material.

Where the lungs or urethra are inflamed to a conſiderable degree, and the abſorption is ſo great, that the mucus is already too thick, and adheres to the membrane from its viſcidity, opiates and bitter vegetable and auſtere acids are improper; and mucilaginous diluents ſhould be uſed in their ſtead with veneſection and torpentia.

III. 1. Abſorption from the cellular membrane, and from all the other cavities of the body, is too ſlowly performed in ſome conſtitutions; hence the bloated pale complexion; and when this occurs in its greateſt degree, it becomes an univerſal dropſy. Theſe habits are liable to intermittent fevers, hyſteric paroxyſms, cold extremities, indigeſtion, and all the ſymptoms of debility.

The abſorbent ſyſtem is more ſubject to torpor or quieſcence than the ſecerning ſyſtem, both from the coldneſs of the fluids which are applied to it, as the moiſture of the atmoſphere, and from the coldneſs of the fluids which we drink; and alſo from its being ſtimulated only by intervals, as when we take our food; whereas the ſecerning ſyſtem is perpetually excited into action by the warm circulating blood; as explained in Sect. XXXII.

" 2. The Peruvian bark, camomile flowers, and other bitter drugs, by ſtimulating this cellular branch " of the abſorbent ſyſtem prevents it from becoming quieſcent; hence the cold paroxyſms of thoſe agues, which ariſe from the torpor of the cellular lymphatics, are prevented, and the hot fits in conſequence. The patient thence preſerves his natural heat, regains his healthy colour, and his accuſtomed ſtrength.

Where the cold paroxyſm of an ague originates in the abſorbents of the liver, ſpleen, or other internal viſcus, the addition of ſteel to vegetable bitters, and eſpecially after the uſe of one doſe of calomel, much advances the cure.

And where it originates in any part of the ſecerning ſyſtem, as is probably the caſe in ſome kinds of agues, the addition of opium in the doſe of a grain and half, given about an hour before the acceſs of the paroxyſm, or mixed with chalybeate and bitter medicines, enſures the cure. Or the ſame may be effected by wine given inſtead of opium before the paroxyſm, ſo as nearly to intoxicate.

Theſe three kinds of agues are thus diſtinguiſhed; the firſt is not attended with any tumid or indurated viſcus, which the people call an ague cake, and which is evident to the touch. The ſecond is accompanied with a tumid viſcus; and the laſt has generally, I believe, the quartan type, and is attended with ſome degree of arterial debility.

3. This claſs of abſorbent medicines are ſaid to decreaſe irritability. After any part of our ſyſtem has been torpid or quieſcent, by whatever cauſe that

was produced, it becomes afterwards capable of being excited into greater motion by ſmall ſtimuli; hence the hot fit of fever ſucceeds the cold one. As theſe medicines prevent torpor or quieſcence of parts of the ſyſtem, as cold hands or feet, which perpetually happen to weak conſtitutions, the ſubſequent increaſe of irritability of theſe parts is likewiſe prevented.

4. Theſe abſorbent medicines, including both the bitters, and metallic ſalts, and opiates, are of great uſe in the dropſy by their promoting univerſal abſorption; but here evacuations are likewiſe to be produced, as will be treated of in the Invertentia.

5. The matter in ulcers is thickened, and thence rendered leſs corroſive, the ſaline part of it being reabſorbed by the uſe of bitter medicines; hence the bark is uſed with advantage in the cure of ulcers.

6. Bitter medicines ſtrengthen digeſtion by promoting the abſorption of chyle; hence the introduction of hop into the potation uſed at our meals, which as a medicine may be taken advantageouſly, but, like other unneceſſary ſtimuli, muſt be injurious as an article of our daily diet.

The hop may perhaps in ſome degree contribute to the production of gravel in the kidneys, as our intemperate wine-drinkers are more ſubject to the gout, and ale-drinkers to the gravel; in the formation of both which diſeaſes, there can be no doubt, but that the alcohol is the principal, if not the only agent.

7. Vomits greatly increaſe the abſorption from the cellular membrane, as ſquill, and foxglove. The ſquill ſhould be given in the doſe of a grain of the dried root every hour, till it operates upwards and downwards. Four ounces of the freſh leaves of the foxglove ſhould be boiled from two pounds of water to one, and half an ounce of the decoction taken every two hours for four or more doſes. This medicine by ſtimulating into inverted action the abſorbents of the ſtomach, increaſes the direct action of the cellular lymphatics.

Another more convenient way of aſcertaining the doſe of foxglove is by making a ſaturated tincture of it in proof ſpirit; which has the twofold advantage of being invariable in its original ſtrength, and of keeping a long time as a ſhop-medicine without loſing any of its virtue. Put two ounces of the leaves of purple foxglove, digitalis purpurea, nicely dried, and coarſely powdered, into a mixture of four ounces of rectified ſpirit of wine and four ounces of water; let the mixture ſtand by the fire-ſide twenty-four hours frequently ſhaking the bottle, and thus making a ſaturated tincture of digitalis; which muſt be poured from the ſediment or paſſed through filtering paper.

As the ſize of a drop is greater or leſs according to the ſize of the rim of the phial from which it is dropped, a part of this ſaturated tincture is then directed to be put into a two-ounce phial, for the purpoſe of aſcertaining the ſize of the drop. Thirty drops of this tincture is directed to be put into an ounce of mint-water for a draught to be taken twice or thrice a day, till it reduces the anaſarca of the limbs, or removes the difficulty of breathing in hydrothorax, or till it induces ſickneſs. And if theſe do not occur in two or three days, the doſe muſt be gradually increaſed to forty or ſixty drops, or further.

From the great ſtimulus of this medicine the ſtomach is rendered torpid with conſequent ſickneſs, which continues many hours and even days, owing to the great exhauſtion of its ſenſorial power of irritation; and the action of the heart and arteries becomes feeble from the deficient excitement of the ſenſorial power of aſſociation; and laſtly, the abſorbents of the cellular membrane act more violently in conſequence of the accumulation of the ſenſorial power of aſſociation in the torpid heart and arteries, as explained in Suppl. I. 12. Page 250

A circumſtance curiouſly ſimilar to this occurs to ſome people on ſmoking tobacco for a ſhort time, who have not been accuſtomed to it. A degree of ſickneſs is preſently induced, and the pulſations of the heart and arteries become feeble for a ſhort time, as in the approach to fainting, owing to the direct ſympathy between theſe and the ſtomach, that is from defect of the excitement of the power of aſſociation. Then there ſucceeds a tingling, and heat, and ſometimes ſweat, owing to the increaſed action of the capillaries, or perſpirative and mucous glands; which is occaſioned by the accumulation of the ſenſorial power of aſſociation by the weaker action of the heart and arteries, which now increaſes the action of the capillaries.

8. Another method of increaſing abſorption from the cellular membrane is by warm air, or by warm ſteam. If the ſwelled legs of a dropſical patient are incloſed in a box, the air of which is made warm by a lamp or two, copious ſweats are ſoon produced by the increaſed action of the capillary glands, which are ſeen to ſtand on the ſkin, as it cannot readily exhale in ſo ſmall a quantity of air, which is only changed ſo faſt as may be neceſſary to permit the lamps to burn. At the ſame time the lymphatics of the cellular membrane are ſtimulated by the heat into greater action, as appears by the ſpeedy reduction of the tumid legs.

It would be well worth trying an experiment upon a perſon labouring under a general anaſarca by putting him into a room filled with air heated to 120 or 130 degrees, which would probably excite a great general diaphoreſis, and a general cellular abſorption both from the lungs and every other part. And that air of ſo great heat may be borne for many minutes without great inconvenience was ſhewn by the experiments made in heated rooms by Dr. Fordyce and others. Philoſ. Tranſ.

Another experiment of uſing warmth in anaſarca, or in other diſeaſes, might be by immerſing the patient in warm air, or in warm ſteam, received into an oil-ſkin bag, or bathing-tub of tin, ſo managed, that the current of warm air or ſteam ſhould paſs round and cover the whole of the body except the head, which might not be expoſed to it; and thus the abſorbents of the lungs might be induced to act more powerfully by ſympathy with the ſkin, and not by the ſtimulus of heat. See Uſes of Warm Bath, Claſs IV. 2. 2. 1.

IV. 1. Venous abſorption. Cellery, water-creſſes, cabbages, and many other vegetables of the Claſs Tetradynamia, do not increaſe the heat of the body (except thoſe whoſe acrimony approaches to corroſion), and hence they ſeem alone, or principally, to act on the venous ſyſtem; the extremities of which we have ſhewn are abſorbents of the red blood, after it has paſſed the capillaries and glands.

2. In the ſea-ſcurvy and petechial fever the veins do not perfectly perform this office of abſorption; and hence the vibices are occaſioned by blood ſtagnating at their extremities, or extravaſated into the cellular membrane. And this claſs of vegetables, ſtimulating the veins to perform their natural abſorption, without increaſing the energy of the arterial action, prevents future petechiæ, and may aſſiſt the abſorption of the blood already ſtagnated, as

ſoon as its chemical change renders it proper for that operation.

3. The fluids, which are extravaſated, and received into the cells of the cellular membrane, ſeem to continue there for many days, ſo as to undergo ſome chemical change, and are then taken up again by the mouths of the cellular abſorbents. But the new veſſels produced in inflamed parts, as they communicate with the veins, are probably abſorbed again by the veins along with the blood which they contain in their cavities. Hence the blood, which is extravaſated in bruiſes or vibices, is gradually many days in diſappearing; but after due evacuations the inflamed veſſels on the white of the eye, if any ſtimulant lotion is applied, totally diſappear in a few hours.

Amongſt abſorbents affecting the veins we ſhould therefore add the external application of ſtimulant materials; as of vinegar, which makes the lips pale on touching them. Friction, and electricity.

4. Hæmorrhages are of two kinds, either arterial, which are attended with inflammation; or venous, from a deficiency in the abſorbent power of this ſet of veſſels. In the former caſe the torpentia are efficacious; in the latter ſteel, opium, alum, and all the tribe of ſorbentia, are uſed with ſucceſs.

5. Sydenham recommends vegetables of the claſs Tetradynamia in rheumatic pains left after the cure

of intermittents. Theſe pains are perhaps ſimilar to thoſe of the ſea-ſcurvy, and ſeem to ariſe from want of abſorption in the affected part, and hence are relieved by the ſame medicines.

V. 1. Inteſtinal abſorption. Some aſtringent vegetables, as rhubarb, may be given in ſuch doſes as to prove cathartic; and, after a part of it is evacuated from the body, the remaining part augments the abſorption of the inteſtines; and acts, as if a ſimilar doſe had been exhibited after the operation of any other purgative. Hence 4 grains of rhubarb ſtrengthen the bowels, 30 grains firſt empty them.

2. The earthy ſalts, as alum, increaſe the inteſtinal abſorption, and hence induce conſtipation in their uſual doſe; alum is ſaid ſometimes to cure intermittents, perhaps when their ſeat is in the inteſtines, when other remedies have failed. It is uſeful in the diabætes by exciting the abſorbents of the bladder into their natural action; and combined with reſin is eſteemed in the fluor albus, and in gleets. Lime-ſtone or chalk, and probably gypſum, poſſeſs effects in ſome degree ſimilar, and increaſe the abſorption of the inteſtines; and thus in certain doſes reſtrain ſome diarrhœas, but in greater doſes alum I ſuppoſe will act as a cathartic. Five or ten grains produce conſtipation, 20 or 30 grains are either emetic or cathartic.

3. Earth of alum, tobacco-pipe clay, marl, Armenian bole, lime, crab's eyes or claws, and calcined

hartſhorn,

hartſhorn, or bone aſhes, reſtrain fluxes; either mechanically by ſupplying ſomething like mucilage, or oil, or rollers to abate the friction of the aliment over inflamed membranes; or by increaſing their abſorption. The two laſt conſiſt of calcareous earth united to phoſphoric acid, and the Armenian bole and marl may contain iron. By the conſent between the inteſtines and the ſkin 20 grains of Armenian bole given at going into bed to hectic patients will frequently check their tendency to ſweat as well as to purge, and the more certainly if joined with one grain of opium.

VI. 1. Abſorption from the liver, ſtomach, and other viſcera. When inflammations of the liver are ſubdued to a certain degree by veneſection, with calomel and other gentle purges, ſo that the arterial energy becomes weakened, four or eight grains of iron-filings, or of ſalt of ſteel, with the Peruvian bark, have wonderful effect in curing the cough, and reſtoring the liver to its uſual ſize and ſanity; which it ſeems to effect by increaſing the abſorption of this viſcus. The ſame I ſuppoſe happens in reſpect to the tumours of other viſcera, as of the ſpleen, or pancreas, ſome of which are frequently enlarged in agues.

2. Hæmorrhages from the noſe, rectum, kidneys, uterus, and other parts, are frequently attendant on diſeaſed livers; the blood being impeded in the vena portarum from the decreaſed power of abſorption, and in conſequence of the increaſed ſize of this viſcus.

Theſe hæmorrhages after veneſection, and a mercurial cathartic, are moſt certainly reſtrained by ſteel alone, or joined with an opiate; which increaſe the abſorption, and diminiſh the ſize of the liver.

Chalybeates may alſo reſtrain theſe hæmorrhages by their promoting venous abſorption, though they exert their principal effect upon the liver. Hence alſo opiates, and bitters, and vitriolic acid, are advantageouſly uſed along with them. It muſt be added that ſome hæmorrhages recur by periods like the paroxyſms of intermittent fevers, and are thence cured by the ſame treatment.

3. The jaundice is frequently cauſed by the inſipidity of the bile, which does not ſtimulate the gall-bladder and bile-ducts into their due action; hence it ſtagnates in the gall-bladder, and produces a kind of cryſtallization, which is too large to paſs into the inteſtines, blocks up the bile-duct, and occaſions a long and painful diſeaſe. A paralyſis of the bile duct produces a ſimilar jaundice, but without pain.

4. Worms in ſheep called flukes are owing to the dilute ſtate of the bile; hence they originate in the inteſtines, and thence migrate into the biliary ducts, and corroding the liver produce ulcers, cough, and hectic fever, called the rot. In human bodies it is probable the inert ſtate of the bile is one cauſe of the production of worms; which inſipid ſtate of the bile is owing to deficient abſorption of the thinner

parts of it; hence the pale and bloated complexion, and ſwelled upper lip, of wormy children, is owing to the concomitant deficiency of abſorption from the cellular membrane. Salt of ſteel, or the ruſt of it, or filings of it, with bitters, increaſe the acrimony of the bile by promoting the abſorption of its aqueous part; and hence deſtroy worms, as well as by their immediate action on the inteſtines, or on the worms themſelves. The cure is facilitated by premiſing a purge with calomel. See Claſs I. 2. 3. 9.

5. The chloroſis is another diſeaſe owing to the deficient action of the abſorbents of the liver, and perhaps in ſome degree alſo to that of the ſecretory veſſels, or glands, which compoſe that viſcus. Of this the want of the catameniæ, which is generally ſuppoſed to be a cauſe, is only a ſymptom or conſequence. In this complaint the bile is deficient perhaps in quantity, but certainly in acrimony, the thinner parts not being abſorbed from it. Now as the bile is probably of great conſequence in the proceſs of making the blood; it is on this account that the blood is ſo deſtitute of red globules; which is evinced by the great paleneſs of theſe patients. As this ſerous blood muſt exert leſs ſtimulus on the heart, and arteries, the pulſe in conſequence becomes quick as well as weak, as explained in Sect. XII. 1. 4.

The quickneſs of the pulſe is frequently ſo great and permanent, that when attended by an accidental cough, the diſeaſe may be miſtaken for hectic fever;

but is cured by chalybeates, and bitters exhibited twice a day; with half a grain of opium, and a grain of aloe every night; and the expected catamenia appears in conſequence of a reſtoration of the due quantity of red blood. This and the two former articles approach to the diſeaſe termed paralyſis of the liver. Sect. XXX. 4.

6. It ſeems paradoxical, that the ſame treatment with chalybeates, bitters, and opiates, which produces menſtruation in chlorotic patients, ſhould repreſs the too great or permanent menſtruation, which occurs in weak conſtitutions at the time of life when it ſhould ceaſe. This complaint is an hæmorrhage owing to the debility of the abſorbent power of the veins, and belongs to the paragraph on venous abſorption above deſcribed, and is thence curable by chalybeates, alum, bitters, and particularly by the exhibition of a grain of opium every night with five grains of rhubarb.

7. Metallic ſalts ſupply us with very powerful remedies for promoting abſorption in dropſical caſes; which frequently are cauſed by enlargement of the liver. Firſt, as they may be given in ſuch quantities as to prove ſtrongly cathartic, of which more will be ſaid in the article on invertentia; and then, when their purgative quality ceaſes, like the effect of rhubarb, their abſorbent quality continues to act. The ſalts of mercury, ſilver, copper, iron, zinc, antimony, have all been uſed in the dropſy; either ſingly for

the former purpoſe, or united with bitters for the latter, and occaſionally with moderate but repeated opiates.

8. From a quarter of a grain to half a grain of blue vitriol given every four or ſix hours, is ſaid to be very efficacious in obſtinate intermittents; which alſo frequently ariſe from an enlarged viſcus, as the liver or ſpleen, and are thence owing to the deficient abſorption of the lymphatics of that viſcus. A quarter of a grain of white arſenic, as I was informed by a ſurgeon of the army, cures a quartan ague with great certainty, if it be given an hour before the expected fit. This doſe he ſaid was for a robuſt man, perhaps one eighth of a grain might be given and repeated with greater ſafety and equal efficacy.

Dr. Fowler has given many ſucceſsful caſes in his treatiſe on this ſubject. He prepares it by boiling ſixty-four grains of white arſenic in a Florence flaſk along with as much pure vegetable fixed alkali in a pint of diſtilled water, till it is diſſolved, and then adding to it as much diſtilled water as will make the whole exactly ſixteen ounces. Hence there are four grains of arſenic in every ounce of the ſolution. This ſhould be put into a phial of ſuch a ſize of the edge of its aperture, that ſixty drops may weigh one dram, which will contain half a grain of arſenic. To children from two years old to four he gives from two to five drops three or four times a day. From five years old to ſeven, he directs from ſeven to eight drops. From eight years old to twelve, he directs from ſeven to ten drops,

drops. From thirteen years old to eighteen he directs from ten to twelve drops. From eighteen upwards, twelve drops. In ſo powerful a medicine it is always prudent to begin with ſmaller doſes, and gradually to increaſe them.

A ſaturated ſolution of arſenic in water is preferable I think to the above operoſe preparation of it; as no error can happen in weighing the ingredients, and it more certainly therefore poſſeſſes an uniform ſtrength. Put much more white arſenic reduced to powder into a given quantity of diſtilled water, than can be diſſolved in it. Boil it for half an hour in a Florence flaſk, or in a tin ſauce-pan; let it ſtand to ſubſide, and filter it through paper. My friend Mr. Greene, a ſurgeon at Brewood in Staffordſhire, aſſured me, that he had cured in one ſeaſon agues without number with this ſaturated ſolution; that he found ten drops from a two-ounce phial given twice a day was a full doſe for a grown perſon, but that he generally began with five.

9. The manner, in which arſenic acts in curing intermittent fevers, cannot be by its general ſtimulus, becauſe no intoxication or heat follows the uſe of it; nor by its peculiar ſtimulus on any part of the ſecreting ſyſtem, ſince it is not in ſmall doſes ſucceeded by any increaſed evacuation, or heat, and muſt therefore exert its power, like other articles of the ſorbentia, on the abſorbent ſyſtem. In what manner it deſtroys life ſo ſuddenly is difficult to underſtand, as it does

not intoxicate like many vegetable poiſons, nor produce fevers like contagious matter. When applied externally it ſeems chemically to deſtroy the part like other cauſtics. Does it chemically deſtroy the ſtomach, and life in conſequence? or does it deſtroy the action of the ſtomach by its great ſtimulus, and life in conſequence of the ſympathy between the ſtomach and the heart? This laſt appears to be the moſt probable mode of its operation.

The ſucceſs of arſenic in the cure of intermittent fevers I ſuſpect to depend on its ſtimulating the ſtomach into ſtronger action, and thus, by the aſſociation of this viſcus with the heart and arteries, preventing the torpor of any part of the ſanguiferous ſyſtem. I was led to this concluſion from the following conſiderations.

Firſt. The effects of arſenic given a long time internally in ſmall doſes, or when uſed in larger quantities externally, ſeem to be ſimilar to thoſe of other great ſtimuli, as of wine or alcohol. Theſe are a bloated countenance, ſwelled legs, hepatic tumours, and dropſy, and ſometimes eruptions on the ſkin. The former of theſe I have ſeen, where arſenic has been uſed externally for curing the itch; and the latter appears on evidence in the famous trial of Miſs Blandy at Chelmsford, about forty years ago.

Secondly. I ſaw an ague cured by arſenic in a child, who had in vain previouſly taken a very large quantity of bark with great regularity. And another caſe of a young officer, who had lived intemperately, and laboured under an intermittent fever, and had taken the bark repeatedly in conſiderable quantities, with a grain of opium at night, and though the paroxyſms had been thrice thus for a time prevented, they recurred in about a week. On taking five drops of a ſaturated ſolution of arſenic thrice a day the paroxyſms ceaſed, and returned no more, and at the ſame time his appetite became much improved.

Thirdly. A gentleman about 65 years of age had for about ten years been ſubject to an intermittent pulſe, and to frequent palpitations of his heart. Lately the palpitations ſeemed to obſerve irregular periods, but the intermiſſion of every third or fourth pulſation was almoſt perpetual. On giving him four drops of a ſaturated ſolution of arſenic from a two-ounce phial about every four hours for one day, not only the palpitation did not return, but the intermiſſion ceaſed entirely, and did not return ſo long as he took the medicine, which was three or four days.

Now as when the ſtomach has its action much weakened by an over-doſe of digitalis, the pulſe is liable to intermit, this evinces a direct ſympathy between theſe parts of the ſyſtem, and as I have repeatedly obſerved, that when the pulſe begins to intermit in elderly people, that an eructation from the ſtomach, voluntarily produced, will prevent the threatened ſtop of the heart; I am induced to think, that the torpid ſtate of the ſtomach, at the inſtant of the production of air occaſioned by its weak action, cauſed the intermiſſion of the pulſe. And that arſenic in this caſe, as well as in the caſes of agues above mentioned, produced its effects by ſtimulating the ſtomach into more powerful action; and that the equality of the motions of the heart was thus reſtored by increaſing the excitement of the ſenſorial power of aſſociation. See Sect. XXV. 17. Claſs IV. 2. 1. 18.

10. Where arſenic has been given as a poiſon, it may be diſcovered in the contents of the ſtomach by the ſmell like garlic, when a few grains of it are thrown on a red-hot iron. 2. If a few grains are placed between two plates of copper, and ſubjected to a red heat, the copper becomes whitened. 3. Diſſolve arſenic in water along with vegetable alkali, add to this a ſolution of blue vitriol in water, and the mixture becomes of a fine green, which gradually precipitates, as diſcovered by Bergman. 4. Where the quantity is ſufficient, ſome wheat may be ſteeped in a ſolution of it, which given to ſparrows or chickens will deſtroy them.

VII. Abſorption of the matter from venereal ulcers. No ulcer can heal, unleſs the abſorption from it is as great as the depoſition in it. The preparations or oxydes of mercury in the cure of the venereal diſeaſe ſeem to act by their increaſing the abſorption of the matter in the ulcers it occaſions; and that whether they are taken into the ſtomach, or applied on the ſkin, or on the ſurface of the ulcers. And thus in the ſame manner as ſugar of lead, or other metallic oxydes, promote ſo rapidly the healing of other ulcers by their external application; and probably when taken internally, as ruſt of iron given to children affected with ſcrophulous ulcers contributes to heal them, and ſolutions of lead were once famous in phthiſis.

The matter depoſited in large abſceſſes does not occaſion hectic fever, till it has become oxygenated by being expoſed to the open air, or to the air through a moiſt membrane; the ſame ſeems to happen to other kinds of matter, which produce fever, or which occaſion ſpreading ulcers, and are thence termed contagious. See Claſs II. 1. 3. II. 1. 5. II. 1. 6. 6. This may perhaps occur from theſe matters not being generally abſorbed, till they become oxygenated; and that it is the ſtimulus of the acid thus formed by their union with oxygen, which occaſions their abſorption into the circulation, and the fever, which they then produce. For though collections of matter, and milk, and mucus, are ſometimes ſuddenly abſorbed during the action of emetics or in ſea-ſickneſs, they are probably eliminated from the body without entering the circulation; that is, they are taken up by the increaſed action of one lymphatic branch, and evacuated by the inverted action of ſome other lymphatic branch, and thus carried off by ſtool or urine.

But as the matter in large abſceſſes is in general not abſorbed, till it becomes by ſome means expoſed to air, there is reaſon to conclude, that the ſtimulus of this new combination of the matter with oxygen occaſions its abſorption; and that hence the abſorption of matter in ulcers of all kinds, is ſtill more powerfully effected by the external application or internal uſe of metallic oxydes; which are alſo acids conſiſting of the metal united with oxygen; and laſtly, becauſe venereal ulcers, and thoſe of itch, and tinea, will not heal without ſome ſtimulant application; that is, the ſecretion of matter in them continues to be greater, than the abſorption of it; and the ulcers at the ſame time continue to enlarge, by the contagion affecting the edges of them; that is, by the ſtimulus of the oxygenated matter ſtimulating the capillary veſſels in its vicinity into actions ſimilar to thoſe of the ulcer, which produces it.

This effect of the oxydes of mercury occurs, whether ſalivation attends its uſe or not. Salivation is much forwarded by external warmth, when mercury is given to promote this ſecretion; but as the cure of venereal complaints depends on its abſorbent quality, the act of ſalivation is not neceſſary or uſeful. A quarter of a grain of good corroſive ſublimate twice a day will ſeldom fail of curing the moſt confirmed pox; and will as ſeldom ſalivate, if the patient be kept cool. A quarter of a grain thrice a day I believe to be infallible, if it be good ſublimate.

Mercury alone when ſwallowed does not act beyond the inteſtines, its active preparations are the ſalts formed by its union with the various acids, as mentioned in the catalogue. Its union with the vegetable acid, when triturated with manna, is ſaid to compoſe

Keyſer's Pill. Triturated with gum arabic it is much recommended by Plenk; and triturated with ſugar and a little eſſential oil, as directed in a former Edinburgh Diſpenſatory, it probably forms ſome of the ſyrups ſold as noſtrums.

United with ſulphur it ſeldom enters the circulation, as when cinnabar, or Æthiop's mineral, are taken inwardly. But united with fat and rubbed on the ſkin, it is readily abſorbed. I know not whether it can be united to charcoal, nor whether it has been given internally when united with animal fat.

VIII. 1. Abſorptions in general are increaſed by inanition; hence the uſe of evacuations in the cure of ulcers. Dr. Jurin abſorbed in one night, after a day's abſtinence and exerciſe, eighteen ounces from the atmoſphere in his chamber; and every one muſt have obſerved, how ſoon his ſheets became dry, after having been moiſtened by ſweat, if he throws off part of the bed-clothes to cool himſelf; which is owing to the increaſed cutaneous abſorption after the evacuation by previous ſweat.

2. Now as opium is an univerſal ſtimulant, as explained in the article on Incitantia, it muſt ſtimulate into increaſed action both the ſecretory ſyſtem, and the abſorbent one; but after repeated evacuation by veneſection, and cathartics, the abſorbent ſyſtem is already inclined to act more powerfully; as the blood-veſſels being leſs diſtended, there is leſs reſiſtance to

the progreſs of the abſorbed fluids into them. Hence after evacuations opium promotes abſorption, if given in ſmall doſes, much more than it promotes ſecretion; and is thus eminently of ſervice at the end of inflammations, as in pleuriſy, or peripneumony, in the doſe of four or five drops of the tincture, given before the acceſs of the evening paroxyſm; which I have ſeen ſucceed even when the riſus ſardonicus has exiſted. Some convulſions may originate in the want of the abſorption of ſome acrid ſecretion, which occaſions pain; hence theſe diſeaſes are ſo much more certainly relieved by opium after veneſection or other evacuations.

IX. 1. Abſorption is increaſed by the calces or ſolutions of mercury, lead, zinc, copper, iron, externally applied; and by arſenic, and by ſulphur, and by the application of bitter vegetables in fine powder. Thus an ointment conſiſting of mercury and hog's fat rubbed on the ſkin cures venereal ulcers; and many kinds of herpetic eruptions are removed by an ointment conſiſting of 60 grains of white precipitate of mercury and an ounce of hog's fat.

2. The tumours about the necks of young people are often produced by the abſorption of a ſaline or acrid material, which has been depoſited from eruptions behind the ears, owing to deficient abſorption in the ſurface of the ulcer, but which on running down on the ſkin below becomes abſorbed, and ſwells

the lymphatic glands of the neck; as the variolous matter, when inſerted into the arm, ſwells the gland of the axilla. Sometimes the perſpirative matter produced behind the ears becomes putrid from the want of daily waſhing them, and may alſo cauſe by its abſorption the tumours of the lymphatics of the neck. In the former caſe the application of a cerate of lapis calaminaris, or of ceruſſa applied in dry powder, or of rags dipped in a ſolution of ſugar of lead, increaſes the abſorption in the ulcers, and prevents the effuſion of the ſaline part of the ſecreted material. The latter is to be prevented by cleanlineſs.

After the eruptions or ulcers are healed a ſolution of corroſive ſublimate of one grain to an ounce of water applied for ſome weeks behind the ear, and amongſt the roots of the hair on one ſide of the head, where the mouths of the lymphatics of the neck open themſelves, frequently removes theſe tumours.

3. Linen rags moiſtened with a ſolution of half an ounce of ſugar of lead to a pint of water applied on the eryſipelas on anaſarcous legs, which have a tendency to mortification, is more efficacious than other applications. White vitriol ſix grains diſſolved in one ounce of roſe-water removes inflammation of the eyes after evacuation more certainly than ſolutions of lead. Blue vitriol two or three grains diſſolved in an ounce of water cures ulcers in the mouth, and other mucous membranes, and a ſolution of arſenic externally applied cures the itch, but requires great caution in the uſe of it. See Claſs II. 1. 5. 6.

4. Bitter vegetables, as the Peruvian bark, quilted between two ſhirts, or ſtrewed in their beds, will cure the ague in children ſometimes. Iron in ſolution, and ſome bitter extract, as in the form of ink, will cure one kind of herpes called the ringworm. And I have ſeen ſeven parts of bark in fine powder mixed with one part of ceruſs, or white lead, in fine powder, applied dry to ſcrophulous ulcers, and renewed daily, with great advantage.

5. To theſe ſhould be added electric ſparks and ſhocks, which promote the abſorption of the veſſels in inflamed eyes of ſcrophulous children; and diſperſe, or bring to ſuppuration, ſcrophulous tumours about the neck. For this laſt purpoſe ſmart ſhocks ſhould be paſſed through the tumours only, by incloſing them between two braſs knobs communicating with the external and internal coating of a charged phial. See Art. II. 2. 2. 2.

X. 1. Bandages increaſe abſorption, if they are made to fit nicely on the part; for which purpoſe it is neceſſary to ſpread ſome moderately adheſive plaſter on the bandage, and to cut it into tails, or into ſhreds two inches wide; the ends are to be wrapped over each other; and it muſt be applied when the part is leaſt tumid, as in the morning before the patient riſes, if on the lower extremities. The emplaſtrum de minio made to cover the whole of a ſwelled leg in this manner, whether the ſwelling is hard, which is uſually termed ſcorbutic; or more eaſily compreſſible, as in anaſarca, reduces the limb in two or three days to its natural ſize; for this purpoſe I have ſometimes uſed carpenter's glue, mixed with one twentieth part of honey to prevent its becoming too hard, inſtead of a reſinous plaſter; but the minium plaſter of the ſhops is in general to be preferred. Nothing ſo much facilitates the cure of ulcers in the legs, as covering the whole limb from the toes to the knee with ſuch a plaſter-bandage; which increaſes the power of abſorption in the ſurface of the ſore.

2. The lymph is carried along the abſorbent veſſels, which are replete with valves, by the intermitted preſſure of the arteries in their neighbourhood. Now if the external ſkin of the limb be lax, it riſes, and gives way to the preſſure of the arteries at every pulſation; and thence the lymphatic veſſels are ſubject to the preſſure of but half the arterial force. But when the external ſkin is tightened by the ſurrounding bandage, and thence is not elevated by the arterial diaſtole, the whole of this power is exerted in compreſſing the lymphatic veſſels, and carrying on the lymph already abſorbed; and thence the abſorbent power is ſo amazingly increaſed by bandage nicely applied. Pains are ſometimes left in the fleſhy parts of the thighs or arms, after the inflammation is gone, in the acute rheumatiſm, or after the patient is too weak for further evacuation; in this caſe after internal abſorbent medicines, as the bark, and opiates, have been uſed in vain, I have ſucceſsfully applied a plaſter-bandage,

as

as above deſcribed, ſo as to compreſs the pained part.

XI. 1. We ſhall conclude by obſerving, that the ſorbentia ſtrengthen the whole habit by preventing the eſcape of the fluid part of the ſecretions out of the body, before it has given up as much nouriſhment, as it is capable; as the liquid part of the ſecretion of urine, ſweat, ſaliva, and of all other ſecretions, which are poured into receptacles. Hence they have been ſaid to brace the body, and been called tonics, which are mechanical terms not applicable to the living bodies of animals; as explained in Sect. XXXII 3. 2.

2. A continued uſe of bitter medicines for years together, as of Portland's powder, or of the bark, is ſuppoſed to induce apoplexy, or other fatal diſeaſes. Two caſes of this kind have fallen under my obſervation; the patients were both rather intemperate in reſpect to the uſe of fermented liquors, and one of them had been previouſly ſubject to the gout. As I believe the gout generally originates from a torpor of the liver, which inſtead of being ſucceeded by an inflammation of it, is ſucceeded by an inflammation of ſome of the joints; or by a pimpled face, which is another mode, by which the diſeaſe of the liver is terminated. I conceive, that the daily uſe of bitter medicine had in theſe patients prevented the removal of a gouty inflammation from the liver to the membranes

of the joints of the extremities, or to the ſkin of the face, by preventing the neceſſary torpor of theſe parts previous to the inflammation of them; in the ſame manner as cold fits of fever are prevented by the ſame medicines; and, as I believe, the returns of the gout have ſometimes for two or three years been prevented by them.

One of theſe patients died of the apoplexy in a few hours; and the other of an inflammation of the liver, which I believe was called the gout, and in conſequence was not treated by veneſection, and other evacuations. From hence it appears, that the daily uſe of hop in our malt liquor muſt add to the noxious quality of the ſpirit in it, when taken to exceſs, and contribute to the production of apoplexy, or inflammation of the liver.

III. CATALOGUE OF THE SORBENTIA.

I. Sorbentia affecting the ſkin.

1. Acid of vitriol, of ſea-ſalt, lemons, ſloes, prunus ſpinoſa, crabs, pyrus, quince, pyrus cydonia, opium.
2. Externally calx of zinc, of lead, of mercury.

II. Sorbentia affecting the mucous membranes.

1. Juice of ſloes, crabs, Peruvian bark, cinchona, opium.
2. Externally blue vitriol.

III. Sorbentia affecting the cellular membrane.

1. Peruvian bark, wormwoods, artemiſia maritima, artemiſia abſynthium, worm-ſeed, artemiſia ſantonicum, chamomile, anthemis nobilis, tanſey tanacetum, bogbean, menyanthes trifoliata, centaury, gentiana centaurium, gentian, gentiana lutea, artichoke-leaves, cynara ſcolymus, hop, humulus lupulus.
2. Orange-peel, cinnamon, nutmeg, mace.
3. Vomits, ſquill, digitalis, tobacco.
4. Bath of warm air, of ſteam.

IV. Sorbentia affecting the veins.

1. Water-creſs, ſiſymbrium naſturtium aquaticum, muſtard, ſinapis, ſcurvy-graſs cochlearia hortenſis, horſe-radiſh cochlearia armoracia, cuckoo-flower, cardamine, dog's-graſs, dandelion, leontodon taraxacon, cellery apium, cabbage braſſica.
2. Chalybeates, bitters, and opium, after ſufficient evacuation.
3. Externally vinegar, friction, electricity.

V. Sorbentia affecting the inteſtines.

1. Rhubarb, rheum palmatum, oak-galls, gallæ quercinæ, tormentil, tormentilla erecta, cinquefoil potentilla, red-roſes, uva urſi, ſimarouba.
2. Logwood, hæmatoxylum campechianum, ſuccus acaciæ, dragon's blood, terra japonica, mimoſa catechu.

3. Alum, earth of alum, Armenian bole, chalk, creta, crab's claws, chelæ cancrorum, white clay, cimolia, calcined hartſhorn, cornu cervi calcinatum, bone-aſhes.

VI. Sorbentia affecting the liver, ſtomach, and other viſcera. Ruſt of iron, filings of iron, ſalt of ſteel, ſal martis, blue vitriol, white vitriol, calomel, emetic tartar, ſugar of lead, white arſenic.

VII. Sorbentia affecting venereal ulcers. Mercury diſſolved or corroded by the following acids:

1. Diſſolved in vitriolic acid, called turpeth mineral, or hydrargyrus vitriolatus.
2. Diſſolved in nitrous acid, called hydrargyrus nitratus ruber.
3. Diſſolved in muriatic acid, mercurius corroſivus ſublimatus, or hydrargyrus muriatus.
4. Corroded by muriatic acid. Calomel.
5. Precipitated from muriatic acid, mercurius precipitatus albus, calx hydrargyri alba.
6. Corroded by carbonic acid? The black powder on crude mercury.
7. Calcined, or united with oxygen.
8. United with animal fat, mercurial ointment.
9. United with ſulphur. Cinnabar.
10. Partially united with ſulphur. Æthiops mineral.
11. Divided by calcareous earth. Hydrargyrus cum cretâ.

12. Divided by vegetable mucilage, by ſugar, by balſams.

VIII. Sorbentia affecting the whole ſyſtem. Evacuations by veneſection and catharſis, and then by the exhibition of opium.

IX. Sorbentia externally applied.
  1. Solutions of mercury, lead, zinc, copper, iron, arſenic; or metallic calces applied in dry powder, as ceruſſa, lapis calaminaris.
  2. Bitter vegetables in decoctions and in dry powders, applied externally, as Peruvian bark, oak bark, leaves of worm-wood, of tanſey, camomile flowers or leaves.
  3. Electric ſparks, or ſhocks.

X. Bandage ſpread with emplaſtrum e minio, or with carpenter's glue mixed with one twentieth part of honey.

XI. Portland's powder, its continued uſe pernicious, and of hops in beer,

Art.

Art. V.

INVERTENTIA.

I. Those things, which invert the natural order of the ſucceſſive irritative motions, are termed invertentia.

1. Emetics invert the motions of the ſtomach, duodenum, and œſophagus.

2. Violent cathartics invert the motions of the lacteals, and inteſtinal lymphatics.

3. Violent errhines invert the naſal lymphatics, and thoſe of the frontal and maxillary ſinuſes. And medicines producing nauſea, invert the motions of the lymphatics about the fauces.

4. Medicines producing much pale urine, as a certain quantity of alcohol, invert the motions of the urinary abſorbents; if the doſe of alcohol is greater, it inverts the ſtomach, producing the drunken ſickneſs.

5. Medicines producing cold ſweats, palpitation of the heart, globus hyſtericus; as violent evacuations, ſome poiſons, fear, anxiety, act by inverting the natural order of the vaſcular motions.

II. Observations on the Invertentia.

I. 1. The action of vomiting ſeems originally to have been occaſioned by diſagreeable ſenſation from the diſtention or acrimony of the aliment; in the ſame manner as when any diſguſtful material is taken into the mouth, as a bitter drug, and is rejected by the retrograde motions of the tongue and lips; as explained in Claſs IV. 1. 1. 2. and mentioned in Sect. XXXV. 1. 3. Or the diſagreeable ſenſation may thus excite the power of volition, which may alſo contribute to the retrograde actions of the ſtomach and œſophagus, as when cows bring up the contents of their firſt ſtomach to re-maſticate it. To either of theſe is to be attributed the action of mild emetics, which ſoon ceaſe to operate, and leave the ſtomach ſtronger, or more irritable, after their operation; owing to the accumulation of the ſenſorial power of irritation during its torpid or inverted action. Such appears to be the operation of ipecacuanha, or of antimonium tartarizatum, in ſmall doſes.

2. But there is reaſon to believe, that the ſtronger emetics, as digitalis, firſt ſtimulate the abſorbent veſſels of the ſtomach into greater action; and that the inverted motions of theſe abſorbents next occur, pouring the lymyh, lately taken up, or obtained from other lymphatic branches, into the ſtomach: the quantity of which in ſome diſeaſes, as in the cholera

morbus, is inconveivable. This inverted motion, firſt of the abſorbents of the ſtomach, and afterwards of the ſtomach itſelf, ſeems to originate from the exhauſtion or debility, which ſucceeds the unnatural degree of action, into which they had been previouſly ſtimulated. An unuſual defect of ſtimulus, as of food without ſpice or wine in the ſtomachs of thoſe, who have been much accuſtomed to ſpice or wine, will induce ſickneſs or vomiting; in this caſe the defective energy of the ſtomach is owing to defect of accuſtomed ſtimulus; while the action of vomiting from digitalis is owing to a deficiency of ſenſorial power, which is previouſly exhauſted by the exceſs of its ſtimulus. See Sect. XXXV. 1. 3. and Claſs IV. 1. 1. 2.

For firſt, no increaſe of heat ariſes from this action of vomiting; which always occurs, when the ſecerning ſyſtem is ſtimulated into action. Secondly, the motions of the abſorbent veſſels are as liable to inverſion as the ſtomach itſelf; which laſt, with the œſophagus, may be conſidered as the abſorbent mouth and belly of that great gland, the inteſtinal canal. Thirdly, the claſs of ſorbentia, as bitters and metallic ſalts, given in large doſes, become invertentia, and vomit, or purge. And laſtly, the ſickneſs and vomiting induced by large potations of wine, or opium, does not occur till next day in ſome people, in none till ſome time after their ingurgitation. And tincture of digitalis in the doſe of 30 or 60 drops, though applied in ſolution, is a conſiderable time before it produces its effect; though vomiting is inſtantaneouſly induced by a nauſeous idea, or a nauſeous taſte in the mouth. At the ſame time there ſeem to be ſome materials, which can immediately ſtimulate the ſtomach into ſuch powerful action, as to be immediately ſucceeded by paralyſis of it, and conſequent continued fever, or immediate death; and this without exciting ſenſation, that is, without our perceiving it. Of theſe are the contagious matter of ſome fevers ſwallowed with the ſaliva, and probably a few grains of arſenic taken in ſolution. See Suppl. I. 8. 8. Art. IV. 2. 6. 9.

3. Some branches of the lymphatic ſyſtem become inverted by their ſympathy with other branches, which are only ſtimulated into too violent abſorption. Thus when the ſtomach and duodenum are much ſtimulated by alcohol, by nitre, or by worms, in ſome perſons the urinary lymphatics have their motion inverted, and pour that material into the bladder, which is abſorbed from the inteſtines. Hence the drunken diabetes is produced; and hence chyle is ſeen in the urine in worm caſes.

When on the contrary ſome branches of the abſorbent ſyſtems have their motions inverted in conſequence of the previous exhauſtion of their ſenſorial power by any violent ſtimulus, other branches of it have their abſorbent power greatly increaſed. Hence continued vomiting, or violent cathartics, produce great abſorption from the cellular membrane in caſes of dropſy; and the fluids thus abſorbed are poured into the ſtomach and inteſtines by the inverted motions of the lacteals and lymphatics. See Sect. XXIX. 4. and 5.

4. The quantity of the doſe of an emetic is not of ſo great conſequence as of other medicines, as the greateſt part of it is rejected with the firſt effort. All emetics are ſaid to act with greater certainty when given in a morning, if an opiate had been given the night before. For the ſenſorial power of irritation of the ſtomach had thus been in ſome meaſure previouſly exhauſted by the ſtimulus of the opium, which thus facilitates the action of the emetic; and which, when the doſe of opium has been large, is frequently followed on the next day by ſpontaneous ſickneſs and vomitings, as after violent intoxication.

Ipecacuanha is the moſt certain in its effect from five grains to thirty; white vitriol is the moſt expeditious in its effect, from twenty grains to thirty diſſolved in warm water; but emetic tartar, antimonium tartarizatum, from one grain to four to ſane people, and from thence to twenty to inſane patients, will anſwer moſt of the uſeful purpoſes of emetics; but nothing equals the digitalis purpurea for the purpoſe of abſorbing water from the cellular membrane in the anaſarca pulmonum, or hydrops pectorus. See Art. II. 3. 7.

II. Violent cathartics. 1. Where violent cathartics are required, as in dropſies, the ſquill in dried powder made into ſmall pills of a grain, or a grain and a half, one to be given every hour till they operate briſkly, is very efficacious; or half a grain of emetic tartar diſſolved in an ounce of peppermit-water, and given every hour, till it operates. Scammony, and other ſtrong purges, are liable to produce hypercatharſis, if they are not nicely prepared, and accurately weighed, and are thence dangerous in common practice. Gamboge is uncertain in its effects, it has otherwiſe the good property of being taſteleſs; and on that account ſome preparation of it might be uſeful for children, by which its doſe could be aſcertained, and its effects rendered more uniform.

2. In inflammation of the bowels with conſtipation, calomel, given in the doſe from ten to twenty grains after due veneſection, is moſt efficacious; and if made into very ſmall pills is not liable to be rejected by vomiting, which generally attends thoſe caſes. When this fails, a grain of aloes every hour will find its way, if the bowel is not deſtroyed; and ſometimes, I believe, if it be, when the mortification is not extenſive. If the vomiting continues after the pain ceaſes, and eſpecially if the bowels become tumid with air, which ſounds on being ſtruck with the finger, theſe patients ſeldom recover. Opiates given along with the cathartics I believe to be frequently injurious in inflammation of the bowels, though they may thus be given with advantage in the ſaturnine colic; the pain and conſtipation in which diſeaſe are owing to torpor or inactivity, and not to too great action.

III. Violent errhines and ſialagogues. 1. Turpeth mineral in the quantity of one grain mixed with ten grains of ſugar anſwers every purpoſe to be expected from errhines. Their operation is by inverting the motions of the lymphatics of the membrane, which lines the noſtrils, and the caverns of the forehead and cheeks; and may thence poſſibly be of ſervice in the hydrocephalus internus.

Some other violent errhines, as the powder of white hellebore, or Cayan pepper, diluted with ſome leſs acrid powder, are ſaid to cure ſome cold or nervous head-achs; which may be effected by inflaming the noſtrils, and thus introducing the ſenſorial power of ſenſation, as well as increaſing that of irritation; and thus to produce violent action of the membranes of the noſtrils, and of the frontal and maxillary ſinuſes, which may by aſſociation excite into action the torpid membranes, which occaſion the head-ach.

2. A copious ſalivation without any increaſe of heat often attends hyſteric diſeaſes, and fevers with debility, owing to an inverſion of the lymphatics of the mouth, ſee Claſs I. 1. 2. 6. The ſame occurs in the nauſea, which precedes vomiting; and is alſo excitable by diſagreeable taſtes, as by ſquills, or by nauſeous ſmells, or by nauſeous ideas. Theſe are very ſimilar to the occaſional diſcharge of a thin fluid from the noſtrils of ſome people, which recurs at certain periods, and differs from defective abſorption.

IV. Violent diuretics. 1. If nitre be given from a dram to half an ounce in a morning at repeated draughts, the patient becomes ſickiſh, and much pale water is thrown into the bladder by the inverted action of the urinary lymphatics. Hence the abſorption in ulcers is increaſed and the cure forwarded, as obſerved by Dr. Rowley.

2. Cantharides taken inwardly ſo ſtimulate the neck of the bladder as to increaſe the diſcharge of mucus, which appears in the urine; but I once ſaw a large doſe taken by miſtake, not leſs than half an ounce or an ounce of the tincture, by which I ſuppoſe the urinary lymphatics were thrown into violent inverted motions, for the patient drank repeated draughts of ſubtepid water to the quantity of a gallon or two in a few hours; and during the greateſt part of that time he was not I believe two entire minutes together without making water. A little blood was ſeen in his water the next day, and a ſoreneſs continued a day longer without any other inconvenience.

3. The decoction of foxglove ſhould alſo be mentioned here, as great effuſions of urine frequently follow its exhibition. See Art. IV. 2. 3. 7. And an infuſion or tincture of tobacco as recommended by Dr. Fowler of York.

4. Alcohol, and opium, if taken ſo as to induce ſlight intoxication, and the body be kept cool, and much diluting liquids taken along with them, have a ſimilar effect in producing for a time a greater flow of urine, as moſt intemperate drinkers muſt occaſionally

have obſerved. This circumſtance ſeems to have introduced the uſe of gin, and other vinous ſpirits as a diuretic, unfortunately in the gravel, amongſt ignorant people; which diſeaſe is generally produced by fermented or ſpirituous liquors, and always increaſed by them.

5. Fear and anxiety are well known to produce a great frequency of making water. A perſon, who believed he had made a bad purchaſe concerning an eſtate, told me, that he made five or ſix pints of water during a ſleepleſs night, which ſucceeded his bargain; and it is uſual, where young men are waiting in an anti-room to be examined for college preferment, to ſee the chamber-pot often wanted.

V. Cold ſweats about the head, neck, and arms, frequently attend thoſe, whoſe lungs are oppreſſed, as in ſome dropſies and aſthma. A cold ſweat is alſo frequently the harbinger of death. Theſe are from the inverted motions of the cutaneous lymphatic branches of thoſe parts.

III. Catalogue of Invertentia.

I. Emetics, ipecacuanha, emetic tartar, antimonium tartariſatum, ſquill, ſcilla maritima, carduus benedictus, cnicus acarna, chamœmile, anthemis nobilis, white vitriol, vitriolum zinci, foxglove, digitalis purpurea, clyſters of tobacco.

II. Violent cathartics, emetic tartar, ſquill, buckthorn, rhamnus catharticus, ſcammonium, convolvulus ſcammonia, gamboge, elaterium, colocynth, cucumis colocynthis, veratrum.

III. Violent errhines and ſialagogues, Turpeth mineral, hydragyrus vitriolatus, aſarum europæum, euphorbium, capſicum, veratrum, nauſeous ſmells, nauſeous ideas.

IV. Violent diuretics, nitre, ſquill, ſeneka, cantharides, alcohol, foxglove, tobacco, anxiety.

V. Cold ſudorifics, poiſons, fear, approaching death.

Art. VI.

REVERTENTIA.

I. Those things, which reſtore the natural order of the inverted irritative motions, are termed Revertentia.

1. As muſk, caſtor, aſafœtida, valerian, eſſential oils.

2. Externally the vapour of burnt feathers, of volatile ſalts, or oils, bliſters, ſinapiſms.

Theſe reclaim the inverted motions without increaſing the heat of the body above its natural ſtate, if given in their proper doſes, as in the globus hyſtericus, and palpitation of the heart.

The incitantia revert theſe morbid motions more certainly, as opium and alcohol: and reſtore the natural heat more; but if they induce any degree of intoxication, they are ſucceeded by debility, when their ſtimulus ceaſes.

II. OBSERVATIONS ON THE REVERTENTIA.

I. The hyſteric diſeaſe is attended with inverted motions feebly exerted of the œſophagus, inteſtinal canal and lymphatics of the bladder. Hence the borborigmi, or rumbling of the bowels, owing to their fluid contents deſcending as the air beneath aſcends. The globus hyſtericus conſiſts in the retrograde motion of the œſophagus, and the great flow of urine from that of the lymphatics ſpread on the neck of the bladder; and a copious ſalivation ſometimes happens to theſe patients from the inverſion of the lymphatics of the mouth; and palpitation of the heart owing to weak or incipient inverſion of its motions; and ſyncope, when this occurs in its greateſt degree.

Theſe hyſteric affections are not neceſſarily attended with pain; though it ſometimes happens, that pains, which originate from quieſcence, afflict theſe patients, as the hemicrania, which has erroneouſly been termed the clavus hyſtericus; but which is owing ſolely to the inaction of the membranes of that part, like the pains attending the cold fits of intermittents, and which frequently returns like them at very regular periods of time.

Many of the above ſymptoms are relieved by muſk, caſtor, the fœtid gums, valerian, oleum animale, oil of amber, which act in the uſual doſe without heating the body. The pains, which ſometimes attend theſe conſtitutions, are relieved by the ſecernentia, as eſſential oils in common tooth-ach, and balſam of Peru in the flatulent colic. But the incitantia, as opium, or vinous ſpirit, reclaim theſe morbid inverted motions with more certainty, than the fœtids; and remove the pains, which attend theſe conſtitutions, with more certainty than the ſecernentia; but if given in large doſes, a debility and return of the hyſteric ſymptoms occurs, when the effect of the opium or alcohol ceaſes. Opiates and fœtids joined ſeem beſt to anſwer the purpoſe of alleviating the preſent ſymptoms; and the ſorbentia, by ſtimulating the lymphatics and lacteals into continued action, prevent a relapſe of their inverſion, as Peruvian bark, and ruſt of iron. See Claſs I. 3. 1. 10.

II. Vomiting conſiſts in the inverted order of the motions of the ſtomach, and œſophagus; and is alſo attended with the inverted motions of a part of the duodenum, when bile is ejected; and of the lymphatics of the ſtomach and fauces, when nauſea attends, and when much lymph is evacuated. Permanent vomiting is for a time relieved by the incitantia, as opium or alcohol; but is liable to return, when their action ceaſes. A bliſter on the back, or on the ſtomach, is more efficacious for reſtraining vomiting by their ſtimulating into action the external ſkin, and by ſympathy affecting the membranes of the ſtomach. In ſome fevers attended with inceſſant vomiting Sydenham adviſed the patient to put his head under the bed-clothes, till a ſweat appeared on the ſkin, as explained in Claſs IV. 1. 1. 3.

In chronical vomiting I have obſerved crude mercury of good effect in the doſe of half an ounce twice a day. The vomitings, or vain efforts to vomit, which ſometimes attend hyſteric or epileptic patients, are frequently inſtantly relieved for a time by applying flour of muſtard-ſeed and water to the ſmall of the leg; and removing it, as ſoon as the pain becomes conſiderable. If ſinapiſms lie on too long, eſpecially in paralytic caſes, they are liable to produce troubleſome ulcers. A plaſter or cataplaſm, with opium and camphor on the region of the ſtomach, will ſometimes revert its retrograde motions.

III. Violent catharſis, as in diarrhœa or dyſentery, is attended with inverted motions of the lymphatics of the inteſtines, and is generally owing to ſome ſtimulating material. This is counteracted by plenty of mucilaginous liquids, as ſolutions of gum arabic, or ſmall chicken broth, to waſh away or dilute the ſtimulating material, which cauſes the diſeaſe. And then by the uſe of the inteſtinal ſorbentia, Art. IV. 2. 5. as rhubarb, decoction of logwood, calcined hartſhorn, Armenian bole; and laſtly, by the incitantia, as opium.

IV. The diabetes conſiſts in the inverted motions of the urinary lymphatics, which is generally I ſuppoſe owing to the too great action of ſome other branch of the abſorbent ſyſtem. The urinary branch ſhould be ſtimulated by cantharides, turpentine, reſin (which when taken in large doſes may poſſibly excite it into inverted action), by the ſorbentia and opium. The inteſtinal lymphatics ſhould be rendered leſs active by torpentia, as calcareous earth, earth of alum; and thoſe of the ſkin by oil externally applied over the whole body; and by the warm-bath, which ſhould be of 96 or 98 degrees of heat, and the patient ſhould ſit in it every day for half an hour.

V. Inverted motions of the inteſtinal canal with all the lymphatics, which open into it, conſtitute the ileus, or iliac paſſion; in which diſeaſe it ſometimes happens, that clyſters are returned by the mouth. After veneſection from ten grains to twenty of calomel made into very ſmall pills; if this is rejected, a grain of aloe every hour; a bliſter; crude mercury; warm-bath; if a clyſter of iced water?

Many other inverted motions of different parts of the ſyſtem are deſcribed in Claſs I. 3. and which are to be treated in a manner ſimilar to thoſe above deſcribed. It muſt be noted, that the medicines mentioned under number one in the catalogue of revertentia are the true articles belonging to this claſs of medicines. Thoſe enumerated in the other four diviſions are chiefly ſuch things as tend to remove the ſtimulating cauſes, which have induced the inverſion of the motions of the part, as acrimonious contents, or inflammation, of the bowels in diarrhœa, diabetes, or in ileus. But it is probable after theſe remote cauſes are deſtroyed, that the fetid gums, muſk, caſtor, and balſams, might be given with advantage in all theſe caſes.

III. Catalogue of Revertentia.

I. Inverted motions, which attend the hyſteric diſeaſe, are reclaimed, 1. By muſk, caſtor. 2. By aſafœtida, galbanum, ſagapænum, ammoniacum, valerian. 3. Eſſential oils of cinnamon, nutmeg, cloves, infuſion of penny-royal, mentha, pulegium, peppermint, mentha piperita, ether, camphor. 4. Spirit of hartſhorn, oleum animale, ſpunge burnt to charcoal, black-ſnuffs of candles, which conſiſt principally of animal charcoal, wood-ſoot, oil of amber. 5. The incitantia, as opium, alcohol, vinegar. 6. Externally the ſmoke of burnt feathers, oil of amber, volatile ſalt applied to the noſtrils, bliſters, ſinapiſms.

II. Inverted motions of the ſtomach are reclaimed by opium, alcohol, bliſters, crude mercury, ſinapiſms, camphor and opium externally, clyſters with aſafœtida.

III. Inverted motions of the inteſtinal lymphatics are reclaimed by mucilaginous diluents, and by inteſtinal ſorbentia, as rhubarb, logwood, calcined hartſhorn, Armenian bole; and laſtly by incitantia, as opium.

IV. Inverted motions of the urinary lymphatics are reclaimed by cantharides, turpentine, roſin, the ſorbentia, and opium, with calcareous earth, and earth of alum, by oil externally, warm-bath.

V. Inverted motions of the inteſtinal canal are reclaimed by calomel, aloe, crude mercury, bliſters, warm-bath, clyſters with aſafœtida, clyſters of iced water? or of ſpring water further cooled by ſalt diſſolved in water contained in an exterior veſſel? Where there exiſts an introſuſception of the bowel in children, could the patient be held up for a time by the feet with his head downwards, or be laid with his body on an inclined plane with his head downwards, and crude mercury be injected as a clyſter to the quantity of two or three pounds?

Art. VII.

TORPENTIA.

I. Those things, which diminiſh the exertion of the irritative motions, are termed torpentia.

1. As mucus, mucilage, water, bland oils, and whatever poſſeſſes leſs ſtimulus than our uſual food. Diminution of heat, light, ſound, oxygen, and of all other ſtimuli; veneſection, nauſea, and anxiety.

2. Thoſe things which chemically deſtroy acrimony, as calcareous earth, ſoap, tin, alkalies, in cardialgia; or which prevent chemical acrimony, as acid of vitriol in cardialgia, which prevents the fermentation of the aliment in the ſtomach, and its conſequent acidity. Secondly, which deſtroy worms, as calomel, iron filings or ruſt of iron, in the round worms; or amalgama of quickſilver and tin, or tin in very large doſes, in the tape-worms. Will ether in clyſters deſtroy aſcarides? Thirdly, by chemically deſtroying extraneous bodies, as cauſtic alkali, lime, mild alkali in the ſtone. Fourthly, thoſe things which lubricate the veſſels, along which extraneous bodies ſlide, as oil in the ſtone in the urethra, and to expedite the expectoration of hardened mucus; or which leſſen the friction of the contents in the inteſtinal canal in dyſentery or aphtha, as calcined hartſhorn, clay, Armenian bole, chalk, bone-aſhes. Fifthly, ſuch things as ſoften or extend

the cuticle over tumours, or phlegmons, as warm water, poultices, fomentations, or by confining the perſpirable matter on the part by cabbage-leaves, oil, fat, bee's-wax, plaſters, oiled ſilk, externally applied.

Theſe decreaſe the natural heat and remove pains occaſioned by exceſs of irritative motions.

II. Observations on the Torpentia.

I. As the torpentia conſiſt of ſuch materials as are leſs ſtimulating than our uſual diet, it is evident, that where this claſs of medicines is uſed, ſome regard muſt be had to the uſual manner of living of the patient both in reſpect to quantity and quality. Hence wounds in thoſe, who have been accuſtomed to the uſe of much wine, are very liable to mortify, unleſs the uſual potation of wine be allowed the patient. And in theſe habits I have ſeen a delirium in a fever cured almoſt immediately by wine; which was occaſioned by the too mild regimen directed by the attendants. On the contrary in great inflammation, the ſubduction of food, and of ſpirituous drink, contributes much to the cure of the diſeaſe. As by theſe means both the ſtimulus from diſtention of the veſſels, as well as that from the acrimony of the fluids, is decreaſed; but in both theſe reſpects the previous habits of diet of the patients muſt be attended to. Thus if tea be made ſtronger, than the patient has uſually drank it, it belongs to the article ſorbentia; if weaker, it belongs to the torpentia.

II. 2. Water in a quantity greater than uſual diminiſhes the action of the ſyſtem not only by diluting our fluids, and thence leſſening their ſtimulus, but by lubricating the ſolids; for not only the parts of our ſolids have their ſliding over each other facilitated by the interpoſition of aqueous particles; but the particles of mucaginous or ſaccharine ſolutions ſlide eaſier over each other by being mixed with a greater portion of water, and thence ſtimulate the veſſels leſs.

At the ſame time it muſt be obſerved, that the particles of water themſelves, and of animal gluten diſſolved in water, as the glue uſed by carpenters, ſlide eaſier over each other by an additional quantity of the fluid matter of heat.

Theſe two fluids of heat and of water may be eſteemed the univerſal ſolvents or lubricants in reſpect to animal bodies, and thus facilitate the circulation, and the ſecretion of the various glands. At the ſame time it is poſſible, that theſe two fluids may occaſionally aſſume an aerial form, as in the cavity of the cheſt, and by compreſſing the lungs may cauſe one kind of aſthma, which is relieved by breathing colder air. An increaſed quantity of heat by adding ſtimulus to every part of the ſyſtem belongs to the article Incitantia.

III. 3. 1. The application of cold to the ſkin, which is only another expreſſion for the diminution of the degree of heat we are accuſtomed to, benumbs the cutaneous abſorbents into inaction; and by ſympathy the urinary and inteſtinal abſorbents become alſo quieſcent. The ſecerning veſſels continuing their action ſomewhat longer, from the warmth of the blood. Hence the uſual ſecretions are poured into the bladder and inteſtines, and no abſorption is retaken from them. Hence ſprinkling the ſkin with cold water increaſes the quantity of urine, which is pale; and of ſtool, which is fluid; theſe have erroneouſly been aſcribed to increaſed ſecretion, or to obſtructed perſpiration.

The thin diſcharge from the noſtrils of ſome people in cold weather is owing to the torpid ſtate of the abſorbent veſſels of the membrana ſchneideriana, which as above are benumbed ſooner than thoſe, which perform the ſecretion of the mucus.

The quick anhelation, and palpitation of the heart, of thoſe, who are immerſed in cold water, depends on the quieſcence of the external abſorbent veſſels and capillaries. Hence the cutaneous circulation is diminiſhed, and by aſſociation an almoſt univerſal torpor of the ſyſtem is induced; thence the heart becomes incapable to puſh forwards its blood through all the inactive capillaries and glands; and as the terminating veſſels of the pulmonary artery ſuffer a ſimilar inaction by aſſociation, the blood is with difficulty puſhed through the lungs.

Some have imagined, that a ſpaſmodic conſtriction of the ſmaller veſſels took place, and have thus accounted for their reſiſtance to the force of the heart.

But there ſeems no neceſſity to introduce this imaginary ſpaſm; ſince thoſe, who are converſant in injecting bodies, find it neceſſary firſt to put them into warm water to take away the ſtiffneſs of the cold dead veſſels; which become inflexible like the other muſcles of dead animals, and prevent the injected fluid from paſſing.

All the ſame ſymptoms occur in the cold fits of intermittents; in theſe the coldneſs and paleneſs of the ſkin with thirſt evince the diminution of cutaneous abſorption; and the dryneſs of ulcers, and ſmall ſecretion of urine, evince the torpor of the ſecerning ſyſtem; and the anhelation, and coldneſs of the breath, ſhew the terminations of the pulmonary artery to be likewiſe affected with torpor.

After theſe veſſels of the whole ſurface of the body both abſorbent and ſecretory have been for a time torpid by the application of cold water; and all the internal ſecerning and abſorbent ones have been made torpid from their aſſociation with the external; as ſoon as their uſual ſtimulus of warmth is renewed, they are thrown into more than their uſual energy of action; as the hands become hot and painful on approaching the fire after having been immerſed ſome time in ſnow. Hence the face becomes of a red colour in a cold day on turning from the wind, and the inſenſible perſpiration increaſed by repeatedly going into froſty air, but not continuing in it too long at a time.

2. When by the too great warmth of a room or of clothes the ſecretion of perſpirable matter is much increaſed, the ſtrength of the patient is much exhauſted by this unneceſſary exertion of the capillary ſyſtem, and thence of the whole ſecerning and arterial ſyſtem by aſſociation. The diminution of external heat immediately induces a torpor or quieſcence of theſe unneceſſary exertions, and the patient inſtantly feels himſelf ſtrengthened, and exhilarated; the animal power, which was thus waſted in vain, being now applied to more uſeful purpoſes. Thus when the limbs on one ſide are diſabled by a ſtroke of the palſy, thoſe of the other ſide are perpetually in motion. And hence all people bear riding and other exerciſes beſt in cold weather.

Patients in fevers, where the ſkin is hot, are immediately ſtrengthened by cold air; which is therefore of great uſe in fevers attended with debility and heat; but may perhaps be of temporary diſſervice, if too haſtily applied in ſome ſituations of fevers attended with internal topical inflammation, as in peripneumony or pleuriſy, where the arterial ſtrength is too great already, and the increaſed action of the external capillaries being deſtroyed by the cold, the action of the internal inflamed part may be ſuddenly increaſed, unleſs veneſection and other evacuations are applied at the ſame time. Yet in moſt caſes the application of cold is nevertheleſs ſalutary, as by decreaſing the heat of the particles of blood in the cutaneous veſſels, the ſtimulus of them, and the diſtention of the veſſels becomes

comes conſiderably leſſened. In external inflammations, as the ſmall-pox, and perhaps the gout and rheumatiſm, the application of cold air muſt be of great ſervice by decreaſing the action of the inflamed ſkin, though the contrary is too frequently the practice in thoſe diſeaſes. It muſt be obſerved, that for all theſe purpoſes the application of it ſhould be continued a long time, otherwiſe an increaſed exertion follows the temporary torpor, before the diſeaſe is deſtroyed.

3. After immerſion in cold water or in cold air the whole ſyſtem becomes more excitable by the natural degree of ſtimulus, as appears from the ſubſequent glow on the ſkin of people otherwiſe pale; and even by a degree of ſtimulus leſs than natural, as appears by their becoming warm in a ſhort time during their continuance in a bath, of about 80 degrees of heat, as in Buxton bath. See Sect. XII. 2. 1. XXXII. 3. 3.

This increaſed exertion happens to the abſorbent veſſels more particularly, as they are firſt and moſt affected by theſe temporary diminutions of heat; and hence like the medicines, which promote abſorption, the cold-bath contributes to ſtrengthen the conſtitution, that is to increaſe its irritability; for the diſeaſes attended with weakneſs, as nervous fevers and hyſteric diſeaſes, are ſhewn in Section XXXII. 2. 1. to proceed from a want of irritability, not from an exceſs of it. Hence the digeſtion is greater in froſty weather, and the quantity of perſpiration. For theſe purpoſes the application of cold muſt not be continued too long. For in riding a journey in cold weather, when the feet are long kept too cold, the digeſtion is impaired, and cardialgia produced.

4. If the diminution of external heat be too great, produced too haſtily, or continued too long, the torpor of the ſyſtem either becomes ſo great, that the animal ceaſes to live; or ſo great an energy of motion or orgaſm of the veſſels ſucceeds, as to produce fever or inflammation. This moſt frequently happens after the body has been temporarily heated by exerciſe, warm rooms, anger, or intemperance. Hence colds are produced in the external air by reſting after exerciſe, or by drinking cold water. See Claſs I. 2. 2. 1.

Frequent cold immerſions harden or invigorate the conſtitution, which they effect by habituating the body to bear a diminution of heat on its ſurface without being thrown into ſuch extenſive torpor or quieſcence by the conſent of the veſſels of the ſkin with the pulmonary and glandular ſyſtem; as thoſe experience, who frequently uſe the cold-bath. At firſt they have great anhelation and palpitation of heart at their ingreſs into cold water; but by the habit of a few weeks they are able to bear this diminution of heat with little or no inconvenience; for the power of volition has ſome influence over the muſcles ſubſervient to reſpiration, and by its counter efforts gradually prevents the quick breathing, and diminiſhes the aſſociations of the pulmonary veſſels with the cutaneous ones And thus though the ſame quantity of heat is ſubducted from the ſkin, yet the torpor of the pulmonary veſſels and internal glands does not follow. Hence during cold immerſion leſs ſenſorial power is accumulated, and in conſequence, leſs exertion of it ſucceeds on emerging from the bath. Whence ſuch people are eſteemed hardy, and bear the common variations of atmoſpheric temperature without inconvenience. See Sect. XXXII. 3. 2.

IV. Veneſection has a juſt title to be claſſed amongſt the torpentia in caſes of fever with arterial ſtrength, known by the fulneſs and hardneſs of the pulſe. In theſe caſes the heat becomes leſs by its uſe, and all exuberant ſecretions, as of bile or ſweat, are diminiſhed, and room is made in the blood-veſſels for the abſorption of mild fluids; and hence the abſorption alſo of new veſſels, or extravaſated fluids, the produce of inflammation, is promoted. Hence veneſection is properly claſſed amongſt the ſorbentia, as like other evacuations it promotes general abſorption, reſtrains hæmorrhages, and cures thoſe pains, which originate from the too great action of the ſecerning veſſels, or from the torpor of the abſorbents. I have more than once been witneſs to the ſudden removal of nervous head-achs by veneſection, though the patient was already exhauſted, pale, and feeble; and to its great uſe in convulſions and madneſs, whether the patient was ſtrong or weak; which diſeaſes are the conſequence of nervous pains; and to its ſtopping long debilitating hæmorrhages from the uterus, when other means had been in vain eſſayed. In inflammatory pains, and inflammatory hæmorrhages, every one juſtly applies to it, as the certain and only cure.

V. When the circulation is carried on too violently, as in inflammatory fevers, thoſe medicines, which invert the motions of ſome parts of the ſyſtem, retard the motions of ſome other parts, which are aſſociated with them. Hence ſmall doſes of emetic tartar, and ipecacuanha, and large doſes of nitre, by producing nauſea debilitate and leſſen the energy of the circulation, and are thence uſeful in inflammatory diſeaſes. It muſt be added, that if nitre be ſwallowed in powder, or ſoon after it is diſſolved, it contributes to leſſen the circulation by the cold it generates, like ice-water, or the external application of cold air.

VI. The reſpiration of air mixed with a greater proportion of azote than is found in the common atmoſphere, or of air mixed with hydrogen, or with carbonic acid gas, ſo that the quantity of oxygen might be leſs than uſual, would probably act in caſes of inflammation with great advantage. In conſumptions this might be moſt conveniently and effectually applied, if a phthiſical patient could reſide day and night in a porter or ale brewery, where great quantities of thoſe liquors were perpetually fermenting in vats or open barrels; or in ſome great manufactory of wines from raiſins or from ſugar.

Externally the application of carbonic acid gas to cancers and other ulcers inſtead of atmoſpheric air may prevent their enlargement, by preventing the union of oxygen with matter, and thus producing a new contagious animal acid.

III. Catalogue of Torpentia.

1. Veneſection. Arteriotomy.
2. Cold water, cold air, reſpiration of air with leſs oxygen.
3. Vegetable mucilages.
   - *a.* Seeds.—Barley, oats, rice, young peas, flax, cucumber, melon, &c.
   - *b.* Gums.—Arabic, Tragacanth, Senegal, of cherry-trees.
   - *c.* Roots.—Turnip, potatoe, althea, orchis, ſnow-drop.
   - *d.* Herbs.—Spinach, brocoli, mercury.
4. Vegetable acids, lemon, orange, currants, gooſeberries, apples, grape, &c. &c.
5. Animal mucus, hartſhorn jelly, veal broth, chicken water, oil? fat? cream?
6. Mineral acids, of vitriol, nitre, ſea-ſalt.
7. Silence, darkneſs.
8. Invertentia in ſmall doſes, nitre, emetic tartar, ipecacuanha given ſo as to induce nauſea.
9. Antacids.—Soap, tin, alkalies, earths.

10. Medicines preventative of fermentation, acid of vitriol.

11. Anthelmintics.—Indian pink, tin, iron, cowhage, amalgama, ſmoak of tobacco.

12. Lithonthriptics, lixiv. ſaponarium, aqua calcis, fixable air.

13. Externally, warm bath, and poultices, oil, fat, wax, plaſters, oiled ſilk, carbonic acid gas on cancers, and other ulcers.

ADDENDA.

Page 245, *after line* 15, *pleaſe to add*, 'Where the difficulty of breathing is very urgent in the croup, bronchotomy is recommended by Mr. Field.' Memoir of a Medical Society, London, 1773, Vol. IV.

ADDITION.

INABILITY TO EMPTY THE BLADDER.

To be introduced at the end of Claſs III. 2. 1. 6. *on Paralyſis Veſicæ Urinariæ.*

AN inability to empty the bladder frequently occurs to elderly men, and is often fatal. This ſometimes ariſes from their having too long been reſtrained from making water from accidental confinement in public ſociety, or otherwiſe; whence the bladder has become ſo far diſtended as to become paralytic; and not only this, but the neck of the bladder has become contracted ſo as to reſiſt the introduction of the catheter. In this deplorable caſe it has frequently happened, that the forcible efforts to introduce the catheter have perforated the urethra; and the inſtrument has been ſuppoſed to paſs into the bladder when it has only paſſed into the cellular membrane along the ſide of it; of which I believe I have ſeen two or three inſtances; and afterwards the part has become ſo much inflamed as to render the introduction of the catheter into the bladder impracticable.

In this ſituation the patients are in imminent danger, and ſome have adviſed a trocar to be introduced into the bladder from the rectum; which I believe is generally followed by an incurable ulcer. One patient, whom I ſaw in this ſituation, began to make a ſpoonful of water after ſix or ſeven days, and gradually in a few days emptied his bladder to about half its ſize, and recovered; but I believe he never afterwards was able completely to evacuate it.

In this ſituation I lately adviſed about two pounds of crude quickſilver to be poured down a glaſs tube, which was part of a barometer tube, drawn leſs at one end, and about two feet long, into the urethra, as the patient lay on his back; which I had previouſly performed upon a horſe; this eaſily paſſed, as was ſuppoſed, into the bladder; on ſtanding erect it did not return, but on kneeling down, and lying horizontally on his hands, the mercury readily returned; and on this account it was believed to have paſſed into the bladder, as it ſo eaſily returned, when the neck of the bladder was lower than the fundus of it. But nevertheleſs as no urine followed the mercury, though the bladder was violently diſtended, I was led to believe, that the urethra had been perforated by the previous efforts to introduce a catheter and bougee; and that the mercury had paſſed on the outſide of the bladder into the cellular membrane.

As the urethra is ſo liable to be perforated by the forcible efforts to introduce the catheter, when the bladder is violently diſtended in this deplorable diſeaſe, I ſhould ſtrongly recommend the injection of a pound or two of crude mercury into the urethra to open by its weight the neck of the bladder previous to any violent or very frequent eſſays with a catheter whether of metal or of elaſtic reſin.

LINES,

TO BE PLACED AT THE END OF

ZOONOMIA.

By a Friend.

JAMQUE OPUS EXEGI.

The work is done!—nor Folly's active rage,
Nor Envy's ſelf, ſhall blot the golden page;
Time ſhall admire, his mellowing touch employ,
And mend the immortal tablet, not deſtroy.

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APPENDIX.

NOTE ON FEVER.

THE author of the tragic drama holds ever in reſerve, for his *cloſing ſcenes*, the utmoſt power and energy of his pen. In *theſe* he moſtly gives a looſe to all his fire, and, in a bolder torrent of pathos, indulges his accumulated feelings to flow. By this addreſs of art the cataſtrophe of his piece is rendered much more impreſſive, the mind of the reader or ſpectator becomes more deeply intereſted in the action, and abſorbed in the misfortunes of each character; and thus are the faults or deficiencies of preceding parts either palliated, excuſed, or forgotten.

Our author, in like manner, would appear, even while engaged in the difficulties of Zoonomia, to have ſtill preſerved, in a ſtate of *inactivity*, an abundant ſtore of acumen and ingenuity. Of this, we may preſume, he contemplated an expenditure in the future Supplement to his work; not indeed for the purpoſe of throwing a defenſive or an oblivious mantle over any preceding articles of his ſyſtem, becauſe of ſuch mantle perhaps they ſeldom ſtand in need; but in order that that part which he held to be moſt intereſting, as a point of medical ſcience, might be finiſhed by the higheſt exertion of his mind.

The part of his publication, to which I here allude, embraces and treats of a theory of fever, which its author denominates "the ſympathetic," in order to diſtinguiſh it, as he informs us, from the "mechanical theory of Boerhaave; the ſpaſmodic theory of Hoffman and of Cullen, and the putrid theory of Pringle." To this catalogue might he have added the ſimple, but apparently nameleſs, theory of Brown, and the *convulſive* theory of Ruſh, both of which differ, not a little, from that he has ſo ably attempted to propagate and to defend.

The conception and eſtabliſhment of a juſt and defenſible theory of fever, our author appears to have conſidered as an object equally important, intereſting and difficult of ſucceſsful execution. To contribute to the accompliſhment of ſo deſirable an end, has been doubtleſs with him a very principal aim throughout the whole of his work entitled Zoonomia, or the Laws of Animal Life. As preparatory to an entrance on this difficult and intereſting ſubject, he has given in brief, yet minute and comprehenſive detail, ſtatements and deſcriptions of all the more partial diſeaſes of the ſyſtem of *man*, together with their modes of treatment, agreeably to the moſt modern and approved principles of the healing art. He may even be ſaid to have previouſly conſidered almoſt all the eſſential ſymptoms of fever in a detached or inſulated ſtate, under the characters of local diſeaſes. He has gone farther ſtill,

and

and embraced, in his very comprehenſive ſyſtem of pathology, thoſe combinations of ſymptoms which he conſiders as conſtituting different ſpecies of fever. Theſe ſpecies he has arranged under the claſſes and orders to which he ſuppoſes they reſpectively belong.

Our author has indeed attempted, in the ſcience of medicine, a reformation, or I ſhould rather ſay a revolution, ſimilar to what the philoſophers of France have ſo happily effected in the ſcience of chemiſtry. They have endeavoured to convey a knowledge of the nature and conſtituent parts of chemical ſubſtances through the medium of the names by which they are deſignated. He has attempted to communicate a knowledge of the proximate cauſes of diſeaſes, not indeed by their names, (for the uſual ones are moſtly retained), but by their location or place of aſſignment in his pathological claſſification.

By ſubjoining to his deſcriptions of each more partial diſeaſe, and even to thoſe of what he denominates different ſpecies of fever, ſuccinct accounts of their philoſophy, or of the cauſes from which their ſeveral ſymptoms reſult, he has gradually prepared the mind of the reader for the final evolution of the theory we are now about to conſider.

We might here pauſe for a moment to reflect on the apparent propriety of Dr. Darwin's views relative to the nature, the magnitude, and the extent of febrile affection. He would ſeem to have conſidered fever as embracing within itſelf, or (if the expreſſion be admiſſible) as capable of encloſing within its own prolific matrix, many, if not moſt of the ſubordinate diſeaſes to which the ſyſtem of man is ſubjected. His entertainment of this belief we would infer, partly from his having completed his conſideration of all other diſeaſes, previouſly to his entrance on the elucidation of the theory of fever, and partly from the nature of his obſervations on certain local affections. The opinion appears to be in a great meaſure tenable and juſt. Fever when *violent* diſſpreads its ravages throughout every portion of the body, which other diſeaſes invade only in part. Thus, for example, the alimentary canal and liver; the ſyſtems of blood-veſſels, of lymphatics, of nerves and of muſcles; the cellular membrane, with the various glands and external integuments of the body; the brain, the lungs, and the heart, are occaſionally invaded by this gigantic and formidable diſeaſe.

I well know that thoſe ſubordinate ſyſtems or parts of the body juſt enumerated, are not at all times co-temporary ſufferers in conſequence of an attack of fever; but I alſo know that febrile caſes of ſuch extenſive influence do occaſionally fall under the eye of the practitioner. It is certainly true, as noticed and ably illuſtrated by Dr. Ruſh in his fourth volume of Medical Inquiries and Obſervations, that there exiſt fevers of nothing more than very partial extent. Thus the bilious fever, or at leaſt effects reſulting from cauſes which generally give birth to bilious fever, are at times completely concentrated in the hepatic ſyſtem. Hence the exiſtence of genuine hepatitis without any preceding perceptible diſorder either in the blood-veſſels or indeed in any other part of the body. Colic is frequently nothing elſe than a bilious fever pouring the whole torrent of its power in a ſtate of concentration on ſome particular portion of the alimentary canal. In this caſe any degree of unmaſked and general fever which may eventually ſucceed to the primary viſceral affection, may with undoubted propriety be denominated a fever of ſympathy. Perhaps it might be juſt to conſider the ſcrophula as a certain deſcription of ſlow fever, in its early attack excluſively confined to the ſyſtem of lymphatics. The analogy of its *hiſtory* and *progreſs* with thoſe of genuine phthiſis will furniſh at leaſt ſome ſlight degree of teſtimony in ſupport of ſuch a belief. The leproſy and other cutaneous affections prevailing for the moſt part in the warmer climates of our globe, have been viewed by many as nothing elſe than febrile affections expending their rage on the ſuperficies of the body. If I miſtake not, this opinion is advocated and defended by Doctor Ruſh, in his clinical lectures delivered in the Univerſity of Pennſylvania. It is a fact well known even to the moſt ſuperficial obſervers, that during the prevalence of autumnal diſeaſes in low and flat countries, many of the inhabitants who are exempt from ſevere and dangerous fits of illneſs, are notwithſtanding attacked by diurnal head-achs and other periodical pains ſituated in various parts of the body. At the termination of the ſeaſon of ſickneſs theſe anomalous affections for the moſt part diſappear, and ſeldom occur again till the next return of an epidemic temperament or conſtitution of the atmoſphere. May we not from theſe circumſtances infer, that ſuch complaints are nothing elſe than ſo many maſked or recondite forms of the prevailing epidemic of the ſeaſon and place? more eſpecially as they ſeldom fail to yield to the ſame mode of treatment found moſt efficacious in caſes of unmaſked and general fever? Theſe ſeveral circumſcribed maladies may be conſidered as *fever* artfully lurking in an *ambuſhed ſtate*, and prepared for a more open and daring aſſault, ſhould the patients be ſubjected to exceſſive fatigue, or ſhould they imprudently abandon themſelves to intemperance and diſſipation.

With the truth of theſe obſervations reſpecting the exiſtence of a latent or local ſtate of fever under various forms, Dr. Darwin appears to be duly acquainted and impreſſed. He has embraced and conſidered moſt, if not all, of ſuch forms in different parts of his noſological ſyſtem. But it is not the theory of ſuch deſcriptions of fever which he has ſo ingeniouſly attempted in the valuable Supplement to his work. He has there endeavoured to ſhed light on the philoſophy of fever, not confined to a part, but diffuſed over the whole of the living ſyſtem, through the medium of ſympathy. It muſt not however be forgotten, that our author appears to conſider moſt, if not indeed all, fevers to be nothing more than local diſeaſes in their naſcent or original ſtate. In the entertainment of this belief perhaps he is philoſophically and accurately juſt. The cauſes of fever cannot be ſuppoſed to ope-

rate

rate on the whole of the living ſyſtem at once. Their immediate agency muſt be confined to particular parts. On theſe parts, therefore, and on theſe excluſively, do they primarily produce their pernicious effects. Thus, for inſtance, if the matter of contagion, or any other agent capable of producing fever, be accidentally ſwallowed, and brought into immediate contact with the internal ſurface of the ſtomach, this organ muſt be locally affected before any other part of the ſyſtem can poſſibly ſuffer. The ſame thing may be ſaid with reſpect to the ſkin, when ſubjected to the action of febrile cauſes: a local affection muſt neceſſarily exiſt before the ſyſtem can be ſubjected to the ravages of fever. This is happily illuſtrated and confirmed by the phenomena attending inoculation for the ſmall-pox. If inflammation and a puſtule occur on the inoculated part, ſome degree of general fever ſeldom fails to be excited; but if no ſuch local affection take place, we conſider our attempt for the moſt part abortive, and do not expect any ſubſequent fever. I am therefore induced to believe with our author, that all fevers, or in other words, that *fever* (for perhaps it is an *unit*) is in its incipient or embryo ſtate, nothing more than a *local affection*. Thus the human body is itſelf, at firſt, a ſimple, rude, perhaps a formleſs point, and aſſumes only by degrees that beautiful diverſity, yet regularity of figure, which it exhibits in an adult ſtate.

If then the firſt impreſſions of febrile cauſes produce nothing more than topical affections on the parts to which they are immediately applied, it may be aſked, on what principle, or through what influence, the ravages of *general* fever can ſupervene? The anſwer may be collected from the ingenious ſupplement to the preceding work—We are there informed that *fever* is a diſeaſe of aſſociation; and that it therefore travels from part to part of the human body, ſubject only to the control of the principles and laws of *ſympathy*. It is there indirectly ſuggeſted to us, that were it not for the influence of the power of ſympathy or aſſociation, the production of a general diſeaſe would be an impracticable event. For as no noxious power can be ſuppoſed to operate on every part of the human body at once, neither can its deleterious effects be more extenſive than its immediate operation, unleſs communicated and diffuſed through the medium of ſympathy. Without the aid of ſympathy in what manner could an original impreſſion on the ſtomach produce diſorder in the arterial ſyſtem, rouſe into tumultuous commotion the heart, or excite the moſt painful ſenſations in the head? Without the influence of the power of ſympathy, in what manner could a torpor or inactivity in the veſſels of the feet, give riſe to inflammation in the membrane inveſting the noſe, fauces, and lungs? On what other principle, ſave the influence of ſympathy, can we attempt an explanation of the uniform connection between the uterus and ſtomach, or the well known reciprocity of affection between the uterus and mammæ? Without the exiſtence of a powerful ſympathy of parts, in what manner could a pain and ſlight enlargement of one teſticle only, excite conſiderable ſickneſs at ſtomach, and even involve the whole ſyſtem in the fervor and tumult of fever? A moſt diſtreſſing and even dangerous caſe of this latter deſcription conſtitutes at preſent one of the objects of my attention. Without a knowledge of the ſympathy exiſting between particular parts and the whole of the living ſyſtem, we would be at a loſs to account for the production of general fever by any poſſible deſcription of local injury, as punctures with a ſword, gunſhot wounds, or even the amputation of the larger limbs. In a word, without the exiſtence and active mediation of ſympathy or aſſociation, the ſyſtem of man could not poſſibly be pervaded by *general diſeaſes*, nor could phyſicians be poſſeſſed of the command of *general remedies*. Were it not for the circumſtance of a ſympathetic connection of parts, no remedy could have a power of extending its influence beyond the ſcite of its immediate application. In this caſe we would be unconditionally precluded from the efficacy of external remedies in procuring relief from many internal morbid affections of the ſyſtem. We would be no longer able to remove an inflammation of the pleura or lungs, by giving riſe to veſication on the integuments of the thorax; nor could we any more relieve an obſtinate vomiting, or retrograde action of the ſtomach, by the application of bliſters to the ancles or wriſts. Without the pervaſive influence of ſympathy, the application of ſetons, iſſues, and cauſtics for the relief of many diſeaſes of the ſyſtem, could not have even the ſhadow of a rational exiſtence. Nor would phyſicians be any longer able to triumph in the happy effects of cold applications to different parts of the body, in fevers of a malignant and dangerous nature. Deprived of the kind and conſtant mediation of ſympathy, even the *warm-bath* itſelf would operate to little effect on the debilitated and ſuffering ſyſtem of man.

But it is not external remedies *alone* that would ſuffer by the *extinction* of the power and influence of ſympathy. The agency of *internal remedies* would, by ſuch an event, be no leſs materially affected. It is a circumſtance well known to phyſicians, that many medicines, when taken into the ſtomach, produce their effects on diſtant and very different parts of the ſyſtem, in a much ſhorter time than is requiſite for their abſorption and conveyance to ſuch parts, through the long and mazy channels of circulation. They muſt operate therefore ſolely through the medium of ſympathy or aſſociation of parts. This would appear to be particularly the caſe with opium, with ether, with muſk, with aſafœtida, and perhaps I might add, with the whole of thoſe articles generally arranged by writers on materia medica under the head of antiſpaſmodics. A ſimilar obſervation may be made, relative to by far the greater part of that claſs of medicines denominated *tonics*, from their ſuppoſed power of communicating firmneſs and ſtrength to the human body. It is true indeed that theſe latter medicines do not, like thoſe of the former claſs, produce an inſtantaneous effect on the living ſyſtem. Like them, however, they appear not to be converted into chyle, and in this form received into the volume of circulating fluids, and muſt therefore be, in a great meaſure, if not wholly, confined in their primary operation to the ſtomach alone. From this organ, as from a common fountain, are their effects communicated, through the medium of ſympathy, to the moſt diſtant parts of the living body.

The preſent is not an improper occaſion to obſerve, that the living ſyſtem of man is an extended unit, and that ſympathy may be conſidered as the unitizing principle. Were it not for this pervaſive principle, no one part could be held as abſolutely eſſential to the exiſtence of another. The head, the ſtomach, and the heart, might then be viewed as ſo many inſulated or diſtinct beings, not neceſſarily linked together by a reciprocity of dependencies and good offices. Well might we then, with ſome of the ancient philoſophers, conſider the lungs as a leſſer animal, ſituated in the body of a larger, labouring excluſively for the purpoſes of its own contracted economy. To compare ſmall things with great, ſympathy would appear to be to the living body of man, what the Newtonian principle of gravitation is to the ſolar ſyſtem. It ſerves as a powerful bond of union, and while it ſecures, in the moſt effectual manner, the exiſtence and independence of the whole, preſerves a mutual connection and neceſſary dependence between each of the individual parts. Before concluding my obſervations on this ſubject, I would beg leave to repeat, that as ſympathy appears to be the great generalizing power of the living ſyſtem of man, without its exiſtence and influence we could neither be ſubjected to the attacks of general diſeaſes, nor could we poſſibly avail ourſelves of the exhibition of general remedies. Indeed our demand for ſuch remedies would be wholly precluded; for as morbid affections could be only local, local remedies would be adequate to every poſſible purpoſe of the healing art—We may I think go farther, and even at preſent with confidence aſſert, that notwithſtanding the exiſtence and ever active power of ſympathy, yet moſt if not all diſeaſes are in their embryo or naſcent ſtate nothing more than mere local affections. Morbid cauſes, as already obſerved, muſt be local in their original application—they cannot poſſibly extend to and primarily impreſs every part of the ſyſtem at once. The actual extent of their earlieſt effects cannot be paramount to that of their application or contact—Such morbid effects therefore muſt neceſſarily be local, but may be afterwards diffuſed throughout every part of the ſyſtem through the medium of the laws of aſſociation or ſympathy. Theſe obſervations I conſider, with Dr. Darwin, as peculiarly applicable to the phenomena and nature of *fever*. This formidable diſeaſe, which frequently commits ſuch ravages on the ſhattered ſyſtem of man, appears to be originally nothing more than a topical affection. But nurtured and conducted by the powerful hand of ſympathy, it generally makes rapid acquiſitions of ſtrength, and ſuffers finally no part of the body to eſcape the deſolation of its inroads. Thus the embryo ripple in the lake, at firſt almoſt a viewleſs ſpeck, expands by gradual progreſſion from the centre, till the whole extent of the glaſſy ſurface partakes of the tremulous commotion. And thus may we denominate the *ſympathetic theory* of fever delivered by Darwin not only *ingenious ;* perhaps it is, at leaſt in part, entitled to the higher epithet of *juſt !*

Having thus ſubmitted to the eye of the reader a few preliminary and general obſervations, we will now take the liberty of ſoliciting his attention to a more particular conſideration of the ſubject of fever. Here it would be a reſearch neither uſeleſs nor uninteresting to travel back through the voluminous records of medical ſcience, and inquire into the ſpeculations and opinions of the phyſicians of former ages, relative to the nature of this formidable diſeaſe. But imperious circumſtances preclude me at preſent from engaging in an inveſtigation ſo extenſive and laborious. More leiſure, and much more learning than I have now at command, would be requiſite for the ſatisfactory accompliſhment of ſo very arduous a taſk. To the induſtry and enterprize of the phyſician more occupied in reading than in practice, muſt be conſigned the office of collecting, arranging, and finally imbodying the ſum of the opinions of ancient medical writers, reſpecting the theory or nature of fever. It may not, however, be at all amiſs to pay, on the preſent occaſion, at leaſt a tranſient attention to the febrile theories of certain diſtinguiſhed characters in medicine, who have lived, practiced, and written at a much more modern period.

At the cloſe of the laſt, and the beginning of the preſent century, lived three men almoſt equally celebrated for genius, for learning, and for indefatigable attention to the cultivation and improvement of the healing art. I need ſcarcely inform the reader that Stahl, Boerhaave, and Hoffman are the medical characters to whom I allude. Each of thoſe great phyſicians would ſeem to have directed the principal force of his attention to an aſcertainment of the phenomena, and an inveſtigation of the cauſe of fever, while each of them embraced a theory of the diſeaſe conſiderably different from thoſe of the other two.

Of theſe theories that of Stahl appears to have been conſiderably more fanciful, viſionary, and weak than thoſe of his two illuſtrious co-temporaries. Notwithſtanding this, its plauſible and engaging ſimplicity, the animated and perſuaſive eloquence with which it was delivered, but perhaps above all, the indolence and eaſe in which it indulged its practical adherents, drew after it a numerous retinue of advocates, not only during the life of its author, but later than down to the middle of the current century. I believe it to be a fact, that even at the preſent day, Germany, and perhaps other places alſo, can ſtill furniſh phyſicians who zealouſy adhere to the Stahlian doctrine of fever. This acute and ingenious medical philoſopher, fancied to himſelf the guardianſhip and actual preſence of a certain intelligent and preſervative principle, extended to every part of the living ſyſtem of man. This principle he deſignated by the name of "*anima medica*," or the medical ſoul. To the ſedulous and wiſe exertions of this anima, or guardian principle, to expel from the body ſome noxious agent, he attributed moſt of the diſtreſſing phenomena and commotions of fever. This hypothetical notion, neither founded on experiment, nor deduced from accurate and juſt obſervation, led him to be extremely guarded, and even painfully timid, in the exhibition of remedies, leſt he ſhould unfortunately interfere with the well timed and curative efforts of his favourite principle. The belief in ſuch a vague and fanciful doctrine of fever could not fail of giving birth to a very feeble and indolent ſpecies of practice. Such indeed was that purſued by the celebrated Stahl and his credulous followers. Their ſyſtem of practice appears to have been literally a ſyſtem of delay, and of ſtrangely amuſing themſelves by remaining idle ſpectators of what they conceived to be a ſtruggle for victory between their *anima medica*, and the cauſe of diſeaſe. Often—too often did they ſuffer the former to fall in the combat, without ſtepping forward with the ſlighteſt auxiliary efforts. This ſect of phyſicians might, with more propriety, be denominated *medical lookers on*, than *medical practitioners*; for they appear to have been induſtrious, and perhaps accurate obſervers of human miſery, rather than benevolent philoſophers, anxious and active to procure for their patients a ſpeedy relief from the ravages of diſeaſe. The neceſſary reſult of ſuch a ſyſtem of practice, it requires in the reader no great depth of ſagacity to deſcry. It conſiſted in the loſs of patients, and, finally, in the loſs of reputation and buſineſs.

Very different from that of Profeſſor Stahl was the *febrile doctrine* of his co-temporary, the illuſtrious Boerhaave. As the former was by far too *metaphyſical*, the latter ſeems to have diverged into the oppoſite extreme, and was perhaps fully as much too *mechanical*, in his theory of *fever*. Into this error he appears to have been led, in a great meaſure, by his uniform and ſtrong attachment to the current philoſophy of the period in which he lived. The immediate cauſe of fever he ſuppoſed to conſiſt in a morbid remora, or *ſtagnation* of the humours of the body in the evaneſcent branches of the capillary veſſels. This ſtagnation or ſtoppage of the fluids, Dr. Boerhaave ſeems to have derived from two ſeveral and diſtinct ſources. Its principal cauſe he ſuppoſed to be a morbid lentor,* or coagulation of the humours themſelves,

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* In the appropriation of the term *lentor*, Dr. Boerhaave, and I think moſt of his followers, appear unfortunately to have neglected all definitude of expreſſion, ſometimes uſing it to denote a ſtagnation of the fluids in the extreme capillaries, and at other times to deſignate a thickening or coagulation of the fluids, which he conſidered as the leading cauſe of ſuch ſtagnation. In the following brief obſervations relative to his theory of fever, I ſhall uniformly uſe it in the latter ſenſe.

ſelves, rendering them unfit for the purpoſe of circulary movements through the minute capillary tubes; but he unqueſtionably alleged, that it might alſo be occaſioned, in part, by a *ſpaſm* or *contraction* of the extreme ramifications of the vaſcular ſyſtem—From a late attentive examination of part of the writings of this great phyſician, I am inclined to believe, that his opponents, and perhaps I might alſo add his adherents, have not done him entire juſtice in the opinions they have formed, or at leaſt in the ſtatements they have given, reſpecting his favourite theory of fever. As well as I now recollect, they have all uniformly ſuppoſed him to have placed his proximate cauſe of fever wholly in a lentor or preternatural thickening of the humours of the body, and in the preſence of other deſcriptions of morbific matter. They appear indeed to have conſidered and repreſented him as a moſt complete humoral pathologiſt, literally diſregarding the ſolids in his inquiry into the origin or proximate cauſe of fever. That this, however, was by no means the caſe—that he did not ſuffer his attachment to the *humoral*, to abſorb his whole attention, and render him quite regardleſs of the *ſolid* or *nervous*, pathology, will, I think, appear obvious to any one on a fair and candid examination of his aphoriſms relative to the phenomena and cauſe of fever. From theſe aphoriſms it would ſeem, that the febrile theory of Dr. Boerhaave was leſs ſimple than thoſe of his co-temporaries Dr. Stahl or Dr. Hoffman, the latter of which was afterwards ſo warmly advocated, and ſo extenſively diffuſed through Europe and America by the immenſe talents and induſtry of Dr. Cullen of Edinburgh. The former of theſe theories, as already obſerved, attributed all the phenomena or ſymptoms of fever to the prophylactic, or rather expulſive operations of a ſingle principle, deſignated by the name of *anima medica;* while the latter, as will be more fully ſtated hereafter, derived them alſo immediately from a ſimple unity of cauſe, namely, a general ſpaſm or contraction of the extreme capillaries of the ſyſtem. Thus might Dr. Stahl be juſtly conſidered as ſimply a *metaphyſical*, and Dr. Hoffman as a *ſolid* or *anti-humoral* pathologiſt. Dr. Boerhaave, on the other hand, appears to have been more complex in his views reſpecting the nature and cauſe of fever. He ſought for the true pathology of this diſeaſe neither excluſively in the *ſolids* nor in the *fluids* of the body: His more comprehenſive theory extended to, and actually embraced them both; for while he doubtleſs conſidered a lentor or morbid coagulation of the fluids as the leading cauſe in the production of fever, he at the ſame time admitted, that this cauſe might be aſſiſted in its operation by a preternatural contraction or *cramp*, as he in one place terms it, of the extremities of the vaſcular ſyſtem. A remora or ſtoppage of the thickened fluids in the finer ramifications of the blood-veſſels, together with a quicker contraction of the heart, Dr. Boerhaave conſidered, to uſe his own words, as conſtituting the "eſſence or idea of every acute fever." The preternatural

natural frequency of the contraction of the heart, he ſuppoſed to reſult from an undue impreſſion of the blood on this organ, in conſequence of its partial ſtagnation in the evaneſcent extremities of the arteries and veins. The intentional and neceſſary effect of ſuch contraction he alleged to be, a gradual comminution of the viſcous blood, a progreſſive concoction of the morbific matter it contained, and a conſequent reſtoration of this fluid to a ſtate fitted for the important buſineſs of circulation. From theſe latter obſervations it would ſeem, that Dr. Boerhaave, no leſs than his co-temporary Dr. Stahl, conſidered fever as an effort of the living ſyſtem to produce certain ſalutary alterations in the blood, and to prepare for future expulſion, certain noxious agents with which this fluid had become accidentally charged. Theſe efforts, however, he does not appear to have viewed as under the immediate direction of any intelligent principle reſiding in, and watching over the ſyſtem of man. If I miſtake not, he attributed them in ſome meaſure, if not indeed principally, to a well known mechanical law of the uniform and neceſſary *reaction* * of matter. I cannot help obſerving, on the preſent occaſion, that a belief in the doctrine of the curative powers of *nature*, ſeldom fails to lead phyſicians into a heſitating, weak, and highly inefficient practice. We had doubtleſs much better, as is ably inculcated on us in the writings and public lectures of Dr. Ruſh, wreſt, in moſt caſes, the buſineſs of cure wholly out of the hands of nature, and treat our patients agreeably to the principles and rules of art. Nor do I heſitate in believing, that we will be ſtill more fully convinced of the propriety of this mode of practice, in proportion as our views relative to the nature and cauſe of fever ſhall eventually become more elightened and juſt. Before diſmiſſing this ſubject, it may not be improper to obſerve, that the eaſe with which this theory of fever appeared to ſolve all the phenomena of that diſeaſe, the eminence and authoritative influence of the ſchool of medicine, where it was firſt taught, but perhaps above all, the very high and juſt celebrity of its author, gave it, for a conſiderable length of time, a decided aſcendancy over all others in many, if not indeed in moſt, parts of Europe. Such was the vigour and extent of its diffuſion, that it even overleapt the limits of the ocean, ſunk deep into the medical mind of America, and can boaſt, down to the preſent day, the advocation of many phyſicians educated and reſiding on this ſide the Atlantic.

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* Reſpecting the truth and accuracy of the poſition here laid down, I muſt acknowledge that I cannot poſitively decide. Nor am I now able to remove the uncertainty under which I labour, not having it in my power, at the preſent moment, to lay my hand on that volume of the writings of Dr. Boerhaave, which contains an expoſition of his views on this particular ſubject.

Having thus hazarded a few obſervations on the febrile theory of Dr. Boerhaave, we would now beg leave to ſolicit, for a moment, the reader's attention to that taught by his rival co-temporary the celebrated

Hoffman. What is denominated the *Spaſmodic theory* of fever is generally ſuppoſed to have derived its birth from the active, the ingenious, and the very fruitful mind of this illuſtrious teacher of Medicine. Such allegation may poſſibly be true: It is only juſt however to obſerve, that it is very pointedly and poſitively contradicted by Dr. Ferriar, of Mancheſter, in his preface to a valuable little work entitled *Medical Hiſtories and Reflections*. "The aſſertion," ſays our author, "of a ſpaſmodic ſtate of the extreme veſſels, in the cold ſtage of fevers, for example, commonly aſcribed to Dr. Hoffman, was firſt made by Dr. Piens, in his comprehenſive treatiſe De Febre." Reſpecting this point of literary controverſy I am not able to ſpeak from my own immediate knowledge, having never had an opportunity of conſulting the production of Dr. Piens, to which we are here referred. From the character, however, of Dr. Ferriar, as a man, remarkable for his accuracy, his candour, and his love of truth, I entertain not at preſent the ſhadow of a doubt, but that he is in poſſeſſion of facts fully adequate to the ſupport of the declaration he has made. Nor do I conſider it as at all derogatory from the high reputation of Dr. Hoffman, to deny his having been the father of the ſpaſmodic theory of fever,—a theory, the influence of which is gradually diſſolving away beneath the ſunſhine of later diſcoveries, and which will, in future time, be looked on as nothing more than a ſuperb and laſting monument of the talents of its author and its advocates, and of the enormous errors, (not to ſay inconſiſtencies) of medical ſcience. It may be conſidered as praiſe ſufficient to allow, that from the pen of Dr. Hoffman this theory of fever received ſuch ſupport and elucidation, as to introduce it to the notice and recommend it to the particular conſideration and patronage of the famous Dr. Cullen of Edinburgh.

Illuſtrated and ſupported by all the powers of a man in whom the world knew not which moſt to admire, his learning, his talents, his eloquence, or his urbanity,* a man to whom the attachment of his pupils appeared in ſome inſtances paramount even to their inbred love of life;† and taught in a medical ſchool, at that time without a rival in the world, we have no ground for ſurpriſe at the aſcendancy and dominion which the ſpaſmodic theory of fever acquired. It became indeed for a time almoſt the idol of no inconſiderable portion of the medical world. Nor has its influence, though certainly yielding to the force of diſcovery, and ſinking beneath the reiterated ſtrokes of oppoſition, as yet by any means expired. It mingles itſelf hourly in the conſultations of phyſicians, and it is unneceſſary for me to add, that under a particular modification effected by certain alterations and amendments, it is ſtill ably advocated and taught by the profeſſor of the practice of medicine in the oldeſt and, by far, the moſt reſpectable medical ſchool in America—A ſchool which I flatter myſelf will, at no very diſtant period of time, become equal in celebrity, as there is reaſon to believe it is at preſent in real ſcience and practical utility, to any that the nations of Europe can boaſt!

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* See an eulogium to the memory of Dr. Cullen delivered before the College of Phyſicians of Philadelphia, by Dr. Benjamin Ruſh.

† That I have not here ſubjected myſelf to the charge of the ſlighteſt exaggeration, will appear from the circumſtance of one of the pupils of Dr. Cullen, having riſqued his life in a duel, by way of reſentment againſt what he conceived to be an indignity thrown on the medical and ſcientific reputation of his maſter.

From the writings of Dr. Cullen being like the book of nature, in the hands of every one, and from the juſt illuſtration and ingenious ſupport given to his ſyſtem of phyſic by Dr. Kuhn, in the Univerſity of Pennſylvania, it would be in me ſuperfluous to attempt, at preſent, an analyſis and detail of his theory of fever. To ſuppoſe the medical reader unacquainted with this theory, would indeed be little leſs than to charge him with the moſt conſummate ignorance reſpecting the ſcience of his profeſſion. I muſt here however beg indulgence while I ſtate a few obſervations and ſtrictures on the ſecond chapter of Dr. Cullen's Firſt Lines of the practice of phyſic, in which he favours the public with an expoſition of his proximate cauſe of fever.

Theſe ſtrictural obſervations we would introduce by requeſting the adherents and friends to the Cullenian doctrine of fever, not to take exception to any freedom of remark or liberty of language, we may on the preſent occaſion aſſume. In whatever we may advance we will doubtleſs be *reſpectful*; while in whatever we advance we will endeavour to be *juſt*. Nor will we conceive ourſelves intitled to take even the ſhadow of umbrage, ſhould any one think proper to ſubmit to an examination equally critical and rigid, whatever opinions we may publicly avow either on the preſent or on any future occaſion.

After prefacing this chapter with a very pertinent remark, reſpecting the difficulty of developing the proximate cauſe of fever, the doctor modeſtly declares that he does not "pretend to aſcertain it in a manner that may remove every difficulty; but that he will only endeavour to make ſuch an approach towards it, as he hopes may be of uſe in conducting the practice in that diſeaſe."

Having thus introduced his ſubject, he proceeds to lay down, as the ground work of his ſubſequent reaſonings, nothing more than a bare *preſumptive* hypotheſis. Let us do him the juſtice to hear him in his own words. "As the hot ſtage of fever," ſays our illuſtrious profeſſor, "is ſo conſtantly preceded by a cold ſtage, we *preſume* that the latter is the cauſe of the former." What an illy ſelected! what a froſt-work foundation is here, for the ſupport of a ſolid and maſſy ſuperſtructure! Inſtead of proceeding, as every practical philoſopher ought, from the aſcertainment of facts to the deduction of principles, our author here ſets out with nothing more than what logicians denominate a *petitio principii*. He begins by conſidering as already eſtabliſhed, what it was certainly his duty as a teacher of medical ſcience to have endeavoured to prove. In this he has *widely* (I had almoſt ſaid *unpardonably*) deviated from that logical accuracy and juſtneſs of reaſoning, by which the writings of a philoſopher ſhould never fail to be characterized. But let us even grant him all he here *preſumes* and wiſhes, and paſs on to the conſideration of certain ſubſequent parts of his inveſtigation.

Here I am ſorry to obſerve, that although we are preſented with many juſt and highly important obſervations, yet we find alſo much to controvert, and not a little to condemn. For to paſs in ſilence over his indefinite uſe of the expreſſion "*the energy of the brain*," an expreſſion to which he appears in reality to have annexed no appropriate meaning; not to ſpeak of his claſſing together, as if of a kindred nature, *contagion* and *cold*, *miaſmata* and *fear*, cauſes oppoſite as light and darkneſs in their modes of operation on the human body; he has gone on to call in the agency and aid of a certain imaginary principle, which he denominates the "*vis medicatrix naturæ*," and which is certainly ſufficient alone to caſt a ſhade of diſreſpect on the whole of his elaborate doctrine. A belief in the action and influence of ſuch a principle in the living ſyſtem of man, can, at the preſent day of ſcience, be conſidered in no other light than as a relict of ancient ſuperſtition in medicine. In admitting the exiſtence and operation of this *metaphyſical* principle, (for ſuch I conceive myſelf authoriſed to denominate it) Dr. Cullen appears in reality to have formed for himſelf a more complex theory of fever out of the more ſimple ones previouſly taught by Doctors Stahl and Hoffman. For although the profeſſor of Edinburgh wiſhes to be conſidered as not connecting intelligence with his *vis medicatrix naturæ*, yet does he attribute to this hypothetical principle, certain operations and effects which muſt inevitably proceed from an intelligent ſource. The truth of the matter appears to be, that the doctor finding his progreſs in a favourite ſpeculation oppoſed by an obſtacle, which common means were not in his view ſufficient to remove, called in to his aid the agency of a hidden principle, the power of which as no one can pretend to calculate, he flatteringly hoped that no one would venture to deny. Thus the epic poet having plunged his adventurous hero into a ſituation from which he cannot poſſibly be extricated by the joint exertions of men, calls in the aſſiſtance of ſome friendly deity to facilitate his eſcape. And thus the politic and ambitious Alexander, finding all his efforts inſufficient to untie the celebrated Gordian knot, drew his rapier and at a ſingle blow ſevered the cord on which the knot was formed. Our author having enliſted under his banner this myſterious *vis medicatrix*, could be no longer at a loſs with reſpect to the ſolution of any phenomenon that could poſſibly occur. For as he took the liberty of introducing this *principle* at all, he might, by the ſame rule of privilege, make its agency equal, and even ſuperior, to the difficulty of every poſſible emergence. Accordingly we find him attributing to its operation and influence the phenomena of both the *cold* and *hot* ſtages of fever.

ver.--Strange indeed, that the operation of any *phyſical* cauſe ſhould be immediately productive of effects ſo literally oppoſite! But although he did not acknowledge the circumſtance in words, yet to me it appears obvious, that Dr. Cullen muſt have conſidered his *vis medicatrix* as poſſeſſing ſomething more than the mere phyſical properties of matter—He has certainly ſpoken of its operations as if he held it poſſeſſed of *intelligence* and *volition.*

Not content with aſcribing both the cold and hot ſtages of fever to the agency of the vis medicatrix naturæ, our author goes on further to conjure up, from the tomb of the medical ſyſtem of Hoffman*, an imaginary phenomenon that he may deduce it alſo from the influence of this equally imaginary cauſe. I mean his ſuppoſed *ſpaſmodic affection* of the extremities of the vaſcular ſyſtem, an effect which he in like manner attributes to the action of the *vis medicatrix.* Thus are there three leading phenomena, all equally different from each other, which Dr. Cullen has, notwithſtanding, thought proper to conſider and repreſent as deriving exiſtence from an unity of cauſe.

The next particular, in our author's complex and elaborate theory, to which I ſhall advert, is the *atony* which he ſuppoſes to exiſt in the extreme veſſels of the human body. Though the opinion of the exiſtence of an atony in theſe veſſels may be literally juſt, yet I muſt confeſs that to me it appears in no degree more probable in conſequence of the arguments by which Dr. Cullen has attempted its eſtabliſhment. Here, as in former parts, all is mere hypotheſis, or at beſt ſuperficial and tortured analogy. The following appears to be the ſum and ſubſtance of the Doctor's reaſoning on this ſubject. In many caſes there ſeems to exiſt a ſympathy, or correſpondence of ſtate and action, between the ſtomach and the ſuperficies of the body. During the cold ſtage of fever, there generally occurs more or leſs ſickneſs at ſtomach, which the learned profeſſor ſuppoſed to reſult from an atony of the veſſels of that organ. Hence he concluded that there muſt alſo exiſt an atony in the ſuperficial veſſels of the body, from whence the atony of the ſtomach was derived. If the hackneyed motto of "*ex nihilo nihil fit*," be true, it is certainly in like manner true, that from ſuch *fanciful conceptions* (*opinions* I cannot call them), as thoſe of our author to which I have briefly adverted, no ſolid and practical deductions can poſſibly be drawn. As by the influence and operation of a general and immutable law of nature, every thing begets iſſue in its own likeneſs, viſionary ſpeculations muſt give birth to viſionary reſults.

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* I have here ſpoken of Dr. Hoffman in the light in which he is generally repreſented, namely, as the original founder of the *ſpaſmodic* theory of fever, without by any means vouching for the truth of the allegation.

By way of concluſion on this ſubject, I would obſerve in general, that among all the chains of ſerious reaſoning to which I have ever attended, I do not now recollect any one more truly ſophiſtical and inconcluſive, than that of Dr. Cullen in elucidation and ſupport of his *proximate* cauſe of fever. He felt his future fame deeply involved in the iſſue of his theory, and expended therefore the united exertions of all his powers for its permanent eſtabliſhment. Such were the immenſity of the profeſſor's talents, ingenuity, and learning, that we may ſay of him, with reſpect to his doctrine of fever, what the Ghoſt of the fallen Hector declares of himſelf relating to the melancholy fate of his native city.

> ———————" Si Pergama dextrâ
> Defendi poſſent, etiam hâc defenſa fuiſſent." *

But unfortunately for the permanency of his favourite ſyſtem, it was not compoſed of materials ſufficiently durable to withſtand the ſhock of future advances in the ſcience of medicine. So conſummately weak and indefenſible was it in its nature, that in attempting its eſtabliſhment and ſupport, he could only pile hypotheſis on hypotheſis, thus giving birth to a huge but unfounded fabric, ready to totter in ruin round its builder's hoary and venerable head.

Let not the reader conclude from what I have here advanced, that I am diſpoſed to think lightly of the writings of Dr. Cullen. Far—very far from it—I had almoſt denominated them my *Bible* in the ſcience of medicine. I ſeldom open them without being furniſhed with additional light on the ſubjects of which they immediately treat. They contain indeed an immenſe fund of medical information, on which I am at all times delighted to draw. As ſources of practical information relative to moſt diſeaſes, perhaps they are ſecond to nothing that has yet appeared either in the Engliſh or in any other language. All that I have advanced in the foregoing pages is pointed, not againſt the *practical*, but merely againſt the *ſpeculative*, part of Dr. Cullen's treatiſe on the ſubject of fever.

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* In Engliſh, ſomething of the ſpirit and meaning of this nervous and celebrated quotation, might perhaps be, not inaptly, thus expreſſed.

Had not, where Gods in awful council join'd,
Th' eventful purpoſe ſwell'd each heavenly mind,
" By Grecian wiles that hapleſs Troy ſhould fall,"
Even this right hand had proved her guardian wall.

C. C.

The firſt ſerious and formal oppoſition which appears to have been made in Britain to the medical ſyſtem of Dr Cullen, originated with his co-temporary Dr. Brown of Edinburgh, a man not more remarkable for his genius, than for his enmity, his diſſipation, and his misfortunes. Although this extraordinary character publiſhed a work which is generally denominated a *Syſtem of Medicine*, yet I confeſs I am not able ſatisfactorily to aſcertain, from the moſt attentive examination of it, what were his preciſe views on the ſubject of fever.* The performance is however truly valuable, and has perhaps the additional merit of being, in parts, entirely *original.* It muſt, at leaſt, be accounted an aſtoniſhing work in medicine, to have been written by a man who does not appear to have been remarkable for his literary connections, who *drank* ſo much, and who *practiſed* ſo little.*

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* To ſay, as is moſtly done, that Dr. Brown conceived the nature and eſſence of fever to conſiſt wholly in *debility*, would perhaps be to advance an opinion which that teacher of medicine did not intend. I think it much more delicate, and it is certainly by far more candid and juſt, to acknowledge our ignorance

The febrile theories of the celebrated Doctors Darwin and Ruſh, ſhall conſtitute, in the laſt place, the ſubject of a few obſervations and remarks. Here I beg leave to premiſe, that I neither mean to aſſume the *liberty*, nor to aſſert in myſelf an *ability*, to decide on the general and comparative merit of the writings of theſe two great phyſicians. Such an office would not only be indelicate, and juſtly offenſive in its nature, but would be particularly inconſiſtent with propriety of conduct in a young, and comparatively an uninformed and inexperienced man. In point of delicacy, at leaſt, it will be early enough to enter on ſuch a diſquiſition, after the world ſhall have been deprived of the virtues and ſervices of theſe two great and good men. Should I appear, however, in my

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norance of an author's preciſe views, than to run any riſque of miſrepreſenting his meaning. Though I am at a loſs with reſpect to them, yet I do not mean to inſinuate that others are not ſatisfactorily poſſeſſed of the opinions of Dr. Brown on the ſubject of fever.

* Dr. Brown was never at any time popular as a practical phyſician, but, particularly in the latter part of his life, buſineſs may be ſaid to have entirely deſerted him. Perhaps he died without a ſingle patient under his care.

ſubſequent conſideration of their doctrines, to adopt and advocate, ſometimes the particular opinions of the one, and ſometimes thoſe of the other, I flatter myſelf I may reſt fully confident that an enlightened candour and liberality of ſentiment, the never-failing growth of minds expanded by the ameliorating influence of ſcience, will be my perfect ſecurity againſt the reſentment of either.

As the high medical reputation of Dr. Darwin and Dr. Ruſh will doubtleſs cauſe their theories of fever to be very generally ſought after and read, it would be ſuperfluous in me, on the preſent occaſion, to intrude on the time, and perhaps exhauſt the patience, of the reader, by analyſing either of them in minute and extenſive detail.

On taking a general or collective view of the *febrile theories* of theſe two phyſicians, they appear to be reſpectively characterized by ſeveral principles and opinions very widely *different from*, not to ſay, directly *oppoſite to*, each other; while in other reſpects again they more nearly coincide. I ſhall point out in the following pages ſome of thoſe particulars in which theſe theories moſt ſtrikingly differ, and perhaps take the liberty of ſtating a few obſervations on each.

I. Theſe two medical philoſophers ſeem to differ radically in their views of what may be denominated the *eſſence* or *proximate cauſe* of fever. In other words, they differ moſt widely in their original definitions, or perhaps I might ſay deſcriptions, of this diſeaſe. Thus Dr. Darwin, in the beginning of his ſupplement to the preceding work, defines fever as conſiſting in "the increaſe or diminution of direct or reverſe aſſociated motions," without ſaying in what ſpecific parts of the ſyſtem theſe motions muſt be neceſſarily excited. While Dr. Ruſh, on the other hand, although in page 123 of his fourth volume of Medical Inquiries and Obſervations, he declines giving a definition of fever, in conſideration, as he obſerves, of the many different forms under which it appears; yet in page 134 of the ſame volume, proceeds to lay down a brief generaliſation of his views on the ſubject, by defining this diſeaſe to be "a convulſion in the ſanguiferous, but more obviouſly, in the arterial ſyſtem." The difference between theſe two definitions of the ſame diſeaſe, are too ſtrikingly obvious to demand any comment. I will here however take the liberty of ſtating, with deference, one or two remarks on the nature of the principal, I may indeed ſay the only evidence, which Dr. Ruſh has advanced in favour of the poſition, that fever is a *convulſion* in the arterial ſyſtem. This evidence appears to be of a nature entirely *analogical*. This the Doctor himſelf very ingenuouſly acknowledges in the following paſſage, where alluding to the *convulſive* nature of fever he ſays, "That this is the caſe I infer from the ſtrict *analogy* between ſymptoms of fever, and convulſions in the *nervous* ſyſtem."

Although in diſcuſſions reſpecting objects of ſcience, I am for the moſt part an open enemy to criticiſms on expreſſions or words; yet, on the preſent occaſion, I am

I am induced to deviate for a moment from the immediate track I had determined to purſue, for the purpoſe of ſuggeſting the queſtion, whether or not "convulſion in the *nervous* ſyſtem," be not an expreſſion conſiderably exceptionable? With medical writers this expreſſion is, I know, extremely common. But, in my view, the *commonneſs*, by no means eſtabliſhes the *propriety*, of its uſe. Is it not calculated to miſrepreſent a fact, and thus to convey an error to the mind? Is it true that thoſe convulſions, which Dr. Ruſh and other writers mean to deſignate by this expreſſion, have their immediate ſeat in the *nervous?*—or, Are they not rather diſeaſed affections of the *muſcular*, ſyſtem? To me I muſt confeſs they appear to be unequivocally of the latter deſcription. For although it may be true, that the diſeaſe is produced entirely through the medium of the nerves, yet it is certainly the muſcles which are eventually convulſed. I would by no means poſitively deny the exiſtence of a ſynchronous affection of the nerves; but I am unable, for the moſt part, to diſcover any phenomenon to render ſuch affection certain. Should it be obſerved that the affections to which the Doctor alludes may be denominated convulſions of the nervous ſyſtem, becauſe the nerves appear to be deeply inſtrumental and efficacious in their production; I would reply, that by the ſame rule of reference, they may be as properly denominated *convulſions of the brain;* becauſe it is probably from this organ that the convulſive influence originally proceeds. Were ſuch affections repreſented as convulſions of the *muſcular ſyſtem*, perhaps the phraſeology would be much leſs exceptionable, and would not contribute to the perpetuation of an error in the mind.*

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* In a late converſation on the impropriety of this expreſſion, it was alleged to me by an ingenious pupil of Dr. Ruſh, that that profeſſor had, in his diviſion of the human body into different ſyſtems, conſidered the muſcles as conſtituting a part of the nervous ſyſtem, and that it was therefore, in him, allowable and conſiſtent, to denominate thoſe muſcular affections alluded to in the above paragraph, convulſions of the *nervous ſyſtem*. This ſuggeſtion led me to conſult the writings of Dr. Ruſh, to examine my manuſcript notes taken during my attendance on his lectures, and alſo to interrogate my memory relative to the point immediately in queſtion. But from neither of theſe ſources have I been able to collect any ſubſtantial teſtimony in favour of the belief, that the Doctor conſiders the muſcles as a part of the nervous ſyſtem. Such an opinion I conceive to be indeed by far too fanciful to be entitled to the advocation of this enlightened phyſician.

On what principle, I would beg leave to aſk, can we be led to ſuppoſe, that the muſcles conſtitute a part of the nervous ſyſtem? Is it becauſe the evaneſcent ramifications of nerves appear to be loſt in, and incorporated with, the ſubſtance of the muſcles? Or is it becauſe theſe *latter* organs would ſeem to derive their ſuſceptibility of ſtimulant impreſſions perhaps entirely through the medium of the *former*? If ſo, we are authorized by the ſame rule of induction to declare, that the arteries, the veins, and even the abdominal and other viſcera, conſtitute, in like manner, ſo many different parts of the nervous ſyſtem. Through each of theſe parts are the extremities of nerves moſt minutely diſtributed, and perhaps it is in conſequence of this diſtribution alone, that ſuch parts are rendered alive to the action

Begging pardon of the reader for the length of this critical digreſſion, I muſt now requeſt him to accompany me in the remarks which I originally contemplated. The nature of the evidence adduced by Dr. Ruſh in ſupport of his poſition, that fever is a *convulſion* in the vaſcular ſyſtem is, as already obſerved, entirely *analogical.* It is indeed true that the Doctor has traced this analogy to a very conſiderable extent, having ſtated no leſs than nineteen particulars in which fever exhibits an obvious ſimilitude to what he has denominated convulſions in the nervous ſyſtem. But had the profeſſor adduced tenfold the number of ſuch particulars as theſe, the nature of the evidence would have been in no degree affected. It would have been *analogy* ſtill. To a man poſſeſſing the expanded mind of Dr. Ruſh, it is ſurely needleſs for me to obſerve, that *facts*, and not *analogy*, conſtitute the only proper and ſecure foundation for the erection of ſyſtems, for the eſtabliſhment of principles, or even for the formation of opinions, in ſcience. Though analogy be confeſſedly a very fair and flowery, yet I am ſorry to add, that in point of real ſcience, it is but little better than a fruitleſs, field. Though it abound in mat-

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action of ſtimuli.—With an equal degree of propriety might we pronounce the muſcles to conſtitute a part of the *vaſcular ſyſtem.* Becauſe muſcles are known to be furniſhed with an abundant ſupply of both arteries and veins; and unleſs blood were conveyed to them through the former, and regularly returned through the latter, deſcription of canals, diſeaſe, and death would be the neceſſary reſult.

ters of imagery for the poet's creative imagination, and be rich in metaphor for the flowing tongue of the orator, yet can it furniſh but little, very little aid to the philoſopher's more accurate and deliberative pen.

From what I have here ſaid, let it not be inferred that I mean to deny the doctrine of fever's being a *convulſion* in the vaſcular ſyſtem—No ſuch thing!—Perhaps the doctrine is accurately juſt. I only wiſh to inſinuate, that the medical world may without impropriety hold themſelves at liberty, at leaſt, to ſuſpend their opinion reſpecting the truth of a poſition, in ſupport of which, the talents and ingenuity of the profeſſor of the inſtitutes of medicine in the Univerſity of Pennſylvania, were able to advance nothing but the evidence of *analogy*.*

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* A medical friend of equal learning, acumen, and ingenuity, did me the favour of looking over the preceding obſervations relative to the convulſive action of the blood veſſels in fever. After having conſidered them well, he ſuggeſted to me the *probability* of my not having done literal juſtice to Dr. Ruſh in alleging, that his only evidence exhibited in favour of the poſition, that fever is *a convulſion* in the arterial ſyſtem, is nothing more than the evidence of *analogy*. This ſuggeſtion led me to a farther and more attentive examination of the Doctor's treatiſe on the proximate cauſe of fever. Nor, has ſuch examination had the ſlighteſt tendency to make me change the ground I had originally choſen. I muſt ſtill humbly conceive, that the profeſſor's beautiful fabric of argumentation is excluſively built on the baſis of analogy. It is true, indeed, he has told us that an *irregularity* of arterial action is eaſily diſcoverable by the

II. The next particular I ſhall mention in which Doctors Ruſh and Darwin differ with reſpect to their views of fever, relates to the *diviſion* or *diſtinctions* of this diſeaſe. Thus, Dr. Ruſh declares fever to be a ſimple *unit*, and conſiders all the different forms under which it occaſionally appears, as nothing more than particular *ſtates* of the ſame original affection. But Dr. Darwin, on the other hand, views fever as diviſible into ſeveral diſtinct ſpecies.

ſenſe of touch. This obſervation is certainly founded on numerous and well eſtabliſhed facts.—In fever the arterial action is, in moſt caſes, truly *irregular*: But every irregularity of action does not neceſſarily conſtitute *convulſion*, agreeably to the common acceptation of the term. Conſcious of the truth of this circumſtance, the Doctor proceeds to attempt an eſtabliſhment of the really *convulſive nature* of that irregularity of arterial action, which he conſiders as the proximate cauſe of fever. In this attempt he acknowledges himſelf, that he only treads on analogical ground. His own words will conſtitute the beſt teſtimony in favour of the truth of what I here advance. "This irregular action," ſays the profeſſor, "is in other words, a *convulſion* in the ſanguiferous, but more obviouſly in the arterial ſyſtem. That this is the caſe I infer from the ſtrict *analogy* between ſymptoms of fever, and convulſions in the nervous ſyſtem. I ſhall briefly mention the particulars in which this *analogy* takes place."

From the ſhort quotation, I hope and preſume, it will appear ſufficiently obvious, that I have neither intended, nor done, even the ſhadow of injuſtice to the real nature and ſpirit of Dr. Ruſh's reaſoning on this intricate ſubject: but that, on the other hand, I have the unequivocal ſanction of his own words, in conſidering the evidence he has offered as nothing more than the evidence of *analogy*.

His firſt, and moſt general diviſion of fever, would appear to be that which contemplates this diſeaſe as either *irritative* or *ſenſitive.* Irritative fever he divides into *ſimple* and *compound.* Simple fever he again ſubdivides into what he calls "*febris irritata,*" and "*febris inirritata,*" his ſpecific definitions of which, he has laid down in the ſupplement to the preceding work. Compound fever he has not divided into diſtinct ſpecies, but has declared it to be of different import and danger, accordingly as different parts of the ſyſtem are arreſted by torpor. As well, however, as I now recollect, a *torpor* of the *ſtomach* appears to be with him a cauſa ſine qua non of his compound deſcription of fever. *Senſitive* fever is that in which there exiſts pain in conſequence of the occurrence of actual and topical inflammation. Although Dr. Darwin has not ſpoken pointedly, reſpecting the diviſibility of this deſcription of fever; yet from the ſpirit and nature of his general plan, it is obvious that he muſt conſider it as particularly modified by the occurrence of the inflammation in different parts of the body.

This point of difference in opinion between theſe two great men, may with propriety be conſidered as a ſubject peculiarly favourable for remark and diſcuſſion. I ſhall content myſelf, however, with ſimply obſerving, that the theory of Dr. Ruſh, by, lens-like, concentrating our views on the ſubject of fever, by confining our attention to a unity of cauſe, and, in ſome meaſure alſo, to a unity of effect, is well calculated for

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introducing into the practice of medicine, a peculiarly bold and deſirable *ſimplicity*. While, on the other hand, that of Dr. Darwin, by refering us to a much leſs definitive cauſe, and pointing us to a greater multiplicity of effects, tends more to *divide*, I had almoſt ſaid to *diſtract*, the attention, and thus tends to give birth and continuance to a deſcription of practice leſs ſimple, and perhaps I may add, in ſome caſes, leſs energetic and juſt.

III. A third particular in which theſe two celebrated phyſicians differ widely in their views from each other, is that reſpecting the embryo or earlieſt ſtage of fever. Dr. Ruſh, for example, appears to conſider fever, from the firſt dawning of its onſet, as actually a diſeaſe of the *whole ſyſtem*, and holds the arteries to be the part more immediately attacked. Thus in the fourth volume of his Medical Inquiries and Obſervations, page 130, he diſcloſes his belief on this ſubject in the following words, "The ſtimuli which induce the irregular action or convulſion of fever, act for the moſt part, primarily upon the ſanguiferous, and particularly, upon the arterial ſyſtem." From this, taken in conjunction with other clauſes which might be adduced from his writings, it is ſufficiently evident that the Doctor conſiders fever as originally a *general* and *idiopathic* diſeaſe of the arterial ſyſtem. Very different from this however is the belief of Dr. Darwin. He conſiders fever as a diſeaſe of ſympathy or aſſociation, and holds it therefore to be, in its earlieſt invaſion, nothing more than a *topical* affection. In no part, indeed, of his writings, as well as I now recollect, has he, in expreſs and unequivocal terms, told us, that he views fever, in its firſt attack, as nothing more than a local diſeaſe. But no matter for that. Such a belief is wholly inſeparable from that of its being a diſeaſe of ſympathy. If it were not originally a *local* affection, in what manner could it poſſibly be communicated from part to part of the ſyſtem, in ſubſervience to the principles and laws of aſſociation? Such an event would be wholly impracticable. In conſideration, therefore, of its original locality, and of ſuch locality *alone*, can this event be preſumed to take place. For were its firſt onſet of general extent, it is needleſs to obſerve, that there would be no particular part exempt from diſeaſe, to which a ſubſequent commumication by ſympathy or aſſociation could be effected. It is therefore ſufficiently obvious, that in the very nature of the belief of fever's being a diſeaſe of aſſociation or ſympathy, is neceſſarily interwoven that of its being, in its earlieſt ſtage, nothing more than a local affection*.

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* Should it be inquired, what advantage can eventually reſult from conſidering fever as originally a topical, and afterwards as a ſympathetic diſeaſe? I anſwer, the advantage may probably be conſiderable. Such a doctrine tends to lead phyſicians to a more accurate inveſtigation of the radical ſeats of fever, and conſequently to a more judicious application of topical remedies, for the purpoſe of rendering them productive of general effects. This doctrine may alſo lead to ſucceſsful *inoculation* in certain contagious fevers which are not at preſent communicated in that way.

I have already intimated that in this particular point of doctrine (however novel and erroneous it may appear to ſome) I am diſpoſed to favour and adopt the opinion of the Britiſh phyſician. I have formerly

Perhaps the moſt rational explanation of the well known difference between the violence of the *inoculated* and *natural* ſmall-pox, may be deduced from a knowledge of the intricate and intereſting ſubject of ſympathy. Dr. Darwin ſuppoſes that that particular deſcription of ſmall-pox denominated the *confluent*, reſults from the immediate lodgement of variolous matter in the ſtomach, becauſe that viſcus is poſſeſſed of ſuch an extenſive and powerful ſympathy with the other parts of the body. The diſtinct ſmall-pox, when communicated in the natural way, he conſiders as originating from the fixation and conſequent action of the variolous contagion on the tonſils, or on ſome other part of the fauces or throat. The difference between the violence and danger of theſe two varieties of diſeaſe, our author very ingeniouſly conſiders as reſulting from the difference between the ſympathizing powers of the parts where the variolous matter is originally lodged. The ſtomach, for example, being the moſt powerful ſeat of ſympathy, gives origin, when originally infected, to a confluent and dangerous variety of ſmall-pox. Whereas the tonſils and throat, ſympathizing leſs powerfully with the reſt of the ſyſtem, give riſe, when infected, to a diſtinct and leſs formidable deſcription of diſeaſe.

On the ſame principle may we attempt an explanation of the ſtill ſuperior mildneſs of the inoculated ſmall pox. That part of the body into which the matter of contagion is generally introduced, poſſeſſes but weak powers of ſympathy with the ſyſtem at large. The violence and danger of the ſubſequent diſeaſe would appear, therefore, to correſpond in degree with the ſympathizing power of the part on which the variolous contagion produced its earlieſt effects.

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aſſigned, in part, the reaſons by which I am principally influenced. It may not however be amiſs to be ſomewhat more particular and explicit on this curious and intereſting ſubject.

The laſt practical advantage I ſhall mention as likely to reſult from conſidering fever as originally a local affection, is the happy tendency which ſuch conſideration would probably have to induce patients to apply for medical aid at a very early period of this diſeaſe. Thus, for example, in caſes of the bites of ſerpents, or of animals affected with *rabies canina*, the importance of an early application for relief is univerſally known and acknowledged. On what circumſtance, I would beg leave to aſk, is founded this acknowledgment of the ſupreme importance of ſuch application? Is it not on that, of theſe melancholy affections being originally of nothing more than a local nature and extent? The poiſons introduced into the wounds occaſioned by the teeth of the animals are as yet, in their effects, confined to the ſeats of their immediate application, and have not produced, in the ſyſtem at large, the ravages of *ſympathetic action*. To prevent the occurrence of ſuch action is the only deſideratum neceſſary for the accompliſhment of a cure. This prevention may be, perhaps for the moſt part, effected by early and well directed applications to the original affections, while ſtill in a local ſtate. But I need not add, that if the diſeaſes be ſuffered to become general, through the medium of ſympathy, they too often bid defiance to the beſt directed efforts of the healing art.

Similar obſervations may be made with reſpect to the ſubject of fever, eſpecially of that which derives its origin from miaſma or human contagion. Such fever is nothing elſe than the effect of a peculiar *poiſon* applied to a particular *part*, not extended over the *whole*, of the living ſyſtem. To this part is its primary action confined, and conſtitutes, therefore, originally a local diſeaſe. This diſeaſe often retains its local character for

It is a maxim in phyſics, which will not, I preſume, be denied, nor even controverted, that the primary and *immediate action* of a cauſe cannot, in *extent*, be paramount to *that* of the cauſe itſelf. This maxim is fairly deducible from the univerſally acknowledged truth, that a cauſe cannot *immediately act* where it does not poſitively *exiſt*. Thus, for example, the particles of acid and alkali do not act on, and neutralize each other, unleſs they be brought into immediate contact. The fragrance of a roſe does not regale us beyond the ſphere to which its odoriferous particles are wafted on the atmoſphere. The fluid of light cannot diſcover to us any of the properties of ſurrounding objects, unleſs it be admitted into actual contact with the optic nerve. Nor can the ſubtle matter of heat raiſe the temperature, or augment the bulk of any part of a body, unleſs ſuch part be ſubjected to the immediate impulſe and action of its particles.

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for a conſiderable time, as we have reaſon to believe from the period which not unfrequently elapſes after the original application of the poiſon, before it appears under a general deſcription or form. During the continuance of ſuch locality is doubtleſs a very favourable time for the ſucceſs of preventative applications. Were patients, during this eventful period, to apply for medical aid, and had phyſicians a perfect knowledge of the actual ſeat of diſeaſe (a knowledge no doubt in the power of obſervation to acquire) I have no heſitation in believing, that the direful effects of miaſma or human contagion might be, at leaſt, as certainly (perhaps I may ſay much more certainly) prevented, than thoſe ariſing from the action of the poiſon of ſerpents, or of that of animals affected by canine madneſs.

In like manner, human contagion, miaſmata reſulting from the decompoſition of animal and vegetable ſubſtances, or whatever other agents may be deemed productive of fever, cannot be admitted, nor even ſuppoſed, to produce their primary effects on any other parts of the living body than thoſe to which they are immediately applied. Can it then be alleged, that the ſeat of the actual application of theſe agents is at all times extended over the whole of the ſyſtem? Such a *ſuppoſition* is certainly *inadmiſſible*, not to characterize it by the epithet *abſurd*. But even if they could be primarily applied to every portion of the body, ſtill it appears probable, that there are only certain peculiar parts on which they are capable of originally producing their morbid effects. On parts defended by real cuticle in an unbroken ſtate, it is ſtrongly preſumable, that neither miaſma nor human contagion are able to operate, at leaſt in their uſual degrees of concentration and ſtrength. Thus we know that variolous matter may be applied to the unchafed cuticle without giving origin to the ſlighteſt complaint. A ſimilar obſervation may, in like manner, be often applied to matter diſcharged from a venereal chancre. At other times, however, ſuch is the ſtrength of this latter deſcription of contagion, that it will produce its ſpecific effects even through the unorganized cuticle itſelf. It appears to be a general truth, to which there exiſt few if any exceptions, that ſuch deſcriptions of human contagion as are capable of giving birth to fever, *do not*, perhaps I may ſay *cannot*,

not, originally exert their pernicious influence on ſuch parts as are defended by an unbroken cuticle. This reduces the ſphere of their primary action on the ſyſtem of man to a very narrow compaſs. The mouth appears to be the great port of admiſſion for almoſt all febrile contagions into the human body. By the functions of reſpiration and deglutition, they are ultimately conveyed to the ſeats of their original action. Here they meet with parts readily ſuſceptible of their operation and influence, becauſe ſuch parts are not defended by a membrane completely inorganic. On theſe they fix, and appear doubtleſs to be, in their earlieſt effects, locally confined to the ſpots of their actual application.

In the mouth, then, in the fauces, the pharynx, the larynx, the trachea, the lungs, the œſophagus, the ſtomach, or in ſome other part of the alimentary canal, muſt we ſearch for the original nidus of moſt * contagious fevers. The contagious matter, whether inhaled during an act of inſpiration, or taken in along with aliment or drink, attaches itſelf to one or more of the foregoing parts. On ſuch parts it would appear to produce its earlieſt effects under the form of local diſeaſe. To the ſyſtem at large theſe effects muſt neceſſarily be communicated through the medium of the laws of ſympathy or aſſociation. Phyſicians do not call into queſtion the exiſtence of a general ſympathetic fever, reſulting from the derangement or ſuſpenſion of the natural actions of a part in conſequence of wounds, contuſions, or the inſertion of variolous matter in caſe of inoculation for the ſmall-pox. Why then may they not in like manner admit, that a fever equally ſympathetic may, and actually does, originate from an equal derangement or ſuſpenſion of the natural and healthy action of ſome part of the primæ viæ, in conſequence of the operation of a contagious poiſon? I muſt, for my own part confeſs, that I conceive a belief in the actual occurrence of ſuch an event, to be founded on evidence equally reſpectable with that adduced in ſupport of ſeveral poſitions, which are even honoured with the appellation of principles in medical ſcience. Thus am I therefore diſpoſed, from my preſent views on the ſubject of fever, to decide with Dr. Darwin in favour of its being a diſeaſe of aſſociation or ſympathy.

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* The reader will obſerve that I have ſaid the above mentioned parts appear to be the original ſeats of *moſt*, but perhaps not neceſſarily of *all*, contagious fevers. For I have indeed no heſitation in believing, that other contagions, beſides that of the ſmall-pox, may alſo become productive of fever, by being inſerted beneath the cuticle by means of inciſion or puncture.

IV. A fourth particular, of general import, in which Dr. Darwin and Dr. Ruſh appear to differ with reſpect to their views of *fever*, relates to the ſtate of the *pulſe* eſſential to the nature or conſtitution of that diſeaſe. Dr. Darwin, for example, would ſeem to conſider a preternatural *frequency* of arterial pulſation as the only unequivocal criterion to diſcriminate fever from certain other diſeaſes, to which the ſyſtem of man is occaſionally ſubjected. That this is his belief, will appear evident from the face of the following clauſe, extracted from the Supplement to his work, containing an expoſition of his theory of fever. "But as the *frequency* of the pulſe," ſays the Doctor, "occurs both in the ſtate of torpor, and in that of orgaſm, of the heart and arteries; *this* conſtitutes a criterion to diſtinguiſh fever from other diſeaſes, which are owing to the torpor of ſome parts of the ſyſtem, as pareſis, and hemicrania." Here our author is ſo explicit on the ſubject that, in my view, a mere citation of his words is alone ſufficient to impreſs us with a conviction of his belief, that a preternatural *frequency* of pulſe ought to be conſidered as the diſtinguiſhing phenomenon or characteriſtic of fever.

Very different, however, from that of Dr. Darwin appears to be the opinion of Dr. Ruſh on this particular point of phyſical inquiry. This latter medical philoſopher evidently conſiders a preternatural frequency of arterial action, as nothing elſe than an occaſional concomitant, or at beſt as a ſubordinate ſymptom of the febrile ſtate of the ſyſtem. An *irregularity* of action in the ſanguiferous veſſels, but more eſpecially in the arteries, he holds to be the great criterion or characteriſtic of fever. The quotation of a ſingle clauſe from the profeſſor's Treatiſe on the Proximate Cauſe of Fever, will furniſh the beſt illuſtration of his views on this ſubject.—"Fever," ſays he, "(when not miſplaced) conſiſts in morbid excitement and *irregular* action in the blood-veſſels, more eſpecially in the arteries. This morbid excitement, or irregular action manifeſts itſelf to the fingers, when preſſed upon the radial artery, by preternatural *ſlowleſs*, intermiſſions and depreſſion in what are called inflammatory fevers, and by preternatural frequency without fulneſs or force, in what are called typhus fevers."

From the ſpirit of this paſſage it would appear, that Dr. Ruſh does not conſider frequency of pulſe as particularly characteriſtic of any deſcription of fever, except what is uſually denominated typhus by medical practitioners. It is an *irregularity* of arterial pulſation to which his views are principally directed. This he holds as a *conditio ſine qua non* of the exiſtence of fever; or rather he conſiders it as *fever itſelf*. Frequency of arterial action he alleges to be producible by other cauſes than that of real morbid excitement. Thus he obſerves, that exceſs of action often reſults from violence of exerciſe, and that frequency of pulſe never fails to accompany fear, and other directly debilitating cauſes. Here, however, he declares the action to be ſtill *regular*, and therefore very different from that *irregularity* of action producible only by morbid excitement, and which conſtitutes the proximate cauſe of fever.

Before diſmiſſing this point of medical inveſtigation, we would beg leave to obſerve, that the criterion for fever propoſed by Dr. Darwin appears to be fallacious; while that by Dr. Ruſh deſerves to be conſidered as much leſs exceptionable. Whether or not future diſcoveries in ſcience may yet poſſeſs us of a febrile teſt more accurate and valuable than either, is an event, on the probability of which we preſume not at preſent to determine.

V. The ſubject of *indirect debility* conſtitutes the laſt particular of a general nature, to which I ſhall ſolicit the attention of the reader, as giving riſe to a diverſity of opinion between Doctors Darwin and Ruſh. On this head my obſervations ſhall be neither numerous nor lengthy. Doctor Ruſh alleges that indirect debility, when induced in a certain way, affects the ſyſtem by an accumulation of *excitability* equal to that which reſults from that deſcription of debility denominated *direct.* "This increaſe of excitability," obſerves the learned profeſſor, "is ſaid by Dr. Brown to be confined to a ſtate of direct debility, but it takes place in all caſes of *indirect* debility, where it is *ſuddenly* induced upon the ſyſtem."

On this curious point of pathology Dr. Darwin would appear to entertain a very different opinion. I do not indeed at preſent recollect, that he is in any one part of his writings particularly full and explicit on the ſubject. But from a general ſpirit which pervades the whole of them, it is evident, that he conſiders indirect debility as an exhauſtion of one or more of the ſenſorial powers; and that the parts thus exhauſted are not capable of being rouſed to ſubſequent action by the uſual impreſſion of ſtimuli, before theſe powers ſhall have been again reſtored by a temporary torpor or ſtate of reſt. Nor does the Doctor ſtate any circumſtance as conſtituting an exception to what he conſiders, and advances, as a general truth. He does not intimate that there exiſts any difference in the reſult with reſpect to remaining excitability, between a ſtate of exhauſtion or indirect debility *ſuddenly* induced, and that which has been effected in a more gradual manner. In either caſe he would ſeem to preſume on an equal expenditure of *ſenſorial* power, without the preſence of which, no parts are capable of aſſuming the motions of life. The ſubject is doubtleſs an intricate one, and ſtands perhaps in need of farther obſervation and reſearch, before any deduction relative to it can with propriety be reared to the dignity of a principle in ſcience.

Having thus haſtily traced a few differences in opinion between Dr. Darwin and Dr. Ruſh, in matters of general import in the theory of fever, I ſhall now take the liberty of giving a very brief ſtatement of farther diſagreement between the opinions of theſe two celebrated characters, in certain particulars of ſubordinate moment.

In his *ratio ſymptomatum*, or expoſition of the theory of ſymptoms, Dr. Ruſh obſerves, that "local pains in the head, breaſt, and bones, in fever, appear to be the effects of the irregular determination of the blood to thoſe parts, and to morbid action being thereby induced in them." Whereas Dr. Darwin would aſſign, as the cauſe of theſe pains, the exiſtence of a *torpor*, and a conſequent accumulation of *ſenſorial power* in the parts where ſuch ſymptoms immediately occur.

The diſpoſition to vomit, which often proves ſo troubleſome in caſes of fever, Dr Ruſh attributes to "morbid excitement in the veſſels of the *ſtomach*;" while Dr. Darwin would appear to deduce the ſame ſymptom from a torpor, giving birth to the retrograde movements of this organ.

Coſtiveneſs Dr. Ruſh conſiders as reſulting from a "defect of excitement or natural action" in the bowels; whereas Dr. Darwin alleges this ſymptom of diſeaſe to ſpring, at leaſt in many inſtances, from an increaſed activity in the functions of the lymphatics and abſorbents of the inteſtines. In conſequence of this increaſed activity, the inteſtinal contents are robbed of the whole of their fluidity, and the reſiduum becomes too firm to be eaſily protruded forward by the periſtaltic motions of the ſurrounding tube.

The dryneſs of the ſkin, which ſo uniformly occurs in moſt caſes of fever, Dr. Ruſh ſuppoſes to depend ſimply on "diminiſhed action in the veſſels which terminate on the ſurface of the body." This ſymptom is, however, explained by Dr. Darwin in a very different way. This ingenious philoſopher does not appear to admit, nor even to ſuſpect, a diminution of action in the ſecreting or exhaling veſſels which terminate on the ſuperficies of the body, particularly in caſes where the ſkin retains its uſual, or has acquired an increaſed, degree of temperature. Nor does he believe that there is a leſs quantity of perſpirable matter diſcharged than in a healthy ſtate. He even ſuſpects the quantity to be conſiderably greater; but alleges, that it is no ſooner thrown out on the ſkin than it is again removed partly by the proceſs of evaporation; but perhaps chiefly by the increaſed action of that branch or diviſion of abſorbent veſſels which originate on the ſurface of the body. This explanation by Dr. Darwin is recommended to our notice by a conſiderable degree of ſpeculative ingenuity; but it would ſeem to ſtand in need of certain experiments, and farther obſervations, before it can be conſidered as inveſted with the character of a well eſtabliſhed phyſical truth.

High coloured urine ariſes, in the opinion of Dr. Ruſh, from an "*exceſs*," while that of a *pale* or lighter ſhade originates from "a deficiency, of excitement in the ſecretory veſſels of the kidneys." Theſe phenomena are accounted for by Dr. Darwin on principles entirely different. He ſuppoſes the *high* colour of urine to ariſe, in moſt caſes, from the watery and pellucid parts of this fluid, being taken up in conſequence of an exceſs of action in the *abſorbents* of the bladder, while its paleneſs generally originates from a torpor or inactivity of the ſame veſſels, whence the more watery portion of the urine is not taken up by abſorption, but is ſuffered to be evacuated in a more pale or pellucid ſtate. On this ſubject I would beg permiſſion to obſerve, that a paleneſs of the urine does certainly not at all times indicate a deficiency of excitement and of action in the ſecretory veſſels of the kidneys. As urine of this deſcription is not unfrequently very profuſe in quantity, are we not authoriſed to believe, that under ſuch circumſtances, the ſecretory veſſels of the kidneys are poſſeſſed of even more than their uſual degrees of action?

Dr. Ruſh alleges the dryneſs of the tongue in fever to be occaſioned by "an obſtruction of ſecretion, and its dark and black colour, by a tendency to mortification." The firſt of theſe ſymptoms Dr. Darwin ſuppoſes to proceed, in part, from an exceſſive abſorption, and partly alſo from an increaſed evaporation, from the ſurface of the tongue, in conſequence of the high temperature of the air which neceſſarily ſweeps over this organ, as expelled from the lungs in ſucceſſive acts of expiration. The colour of the tongue he ſuppoſes to be altered, for the moſt part, by the action of aliment or drink.

On the febrile phenomenon of *thirſt*, it may not be amiſs to ſubmit to the reader the following remarks. This troubleſome ſymptom, which Dr. Ruſh conſiders as "probably the effect of a preternatural excitement of the veſſels of the fauces," is explained by Dr. Darwin on a different principle. This latter phyſician ſeems to ſuppoſe thirſt to be ſometimes a diſagreeable ſenſation ſucceeding to a torpor or temporary paralyſis of the ſuperficial or cuticular abſorbents, in conſequence of which they are incapable of taking up from the atmoſphere a ſufficient quantity of fluid for the purpoſes of the ſyſtem. Somewhat ſimilar to this is the opinion of Dr. Fordyce on the ſubject of thirſt, as delivered in his Diſſertation on Simple Fever. This author alleges, that the ſenſation of thirſt may reſult, not only from an affection of the mouth and fauces, but alſo from a ſimple deficiency of water in the ſanguiferous ſyſtem. At other times he ſuppoſes that thirſt may ariſe from the ſtate of the ſtomach alone, independently of any affection of the mouth, or of any lack of aqueous fluid in the blood.

Having thus delivered a few comparative obſervations on the theories of fever preſented to the public, by Doctors Darwin and Ruſh, I ſhall once more invite the reader's attention to an attempt of the latter phyſician to explain a certain febrile phenomenon, a knowledge of the cauſe of which he appears to have juſtly conſidered as an intereſting deſideratum in the ſcience of medicine.

"It only remains," ſays the learned Profeſſor, "to explain the cauſe, why exceſs in the force, or frequency of the action, of the blood-veſſels ſhould ſucceed debility in a part, or in the whole of the body, and be connected for days and weeks with preternatural debility in the muſcles, nerves, brain, and alimentary canal. I ſhall attempt the explanation of this phenomenon by directing the attention of the reader to the operations of nature in other parts of her works."

"1. A calm," continues the Doctor, "may be conſidered as a ſtate of debility in the atmoſphere. It prediſpoſes to a current of air. But is this current proportioned to the loſs of the equilibrium of the air? By no means: It is exceſſive in its force, and tends thereby to deſtroy the works of both nature and art."

"2. The paſſions are given to man on purpoſe to aid the ſlow and uncertain operations of reaſon. But is their action always proportioned to the cauſes which excite them? An acute pneumony, brought on by the trifling injury done to the ſyſtem by the fatigue and heat of an evening ſpent in a dancing-aſſembly, is but a faint repreſentation of the immenſe diſproportion between a trifling affront, and that exceſs of paſſion which ſeeks for gratification in poiſon, aſſaſſination, or a duel. The ſame diſproportion appears between cauſe and effect in public bodies. A haſty word, of no miſchievous influence, has often produced convulſions, and even revolutions, in ſtates and empires."

The Doctor goes on ſtill farther, to adduce additional inſtances of phyſical phenomena, in which there appears an equal diſproportion between the magnitude of cauſe and effect. Nor does he propoſe any other facts, or attempt any other ſpeculation than the ſimple adduction of ſuch inſtances, for the explication of the very intricate phenomenon to which his views were directed.

With all deference to Dr. Ruſh's authority as a profeſſor, to his dignity as a philoſopher, and to his learning and ingenuity as a man, I muſt conceive, that, in the preſent inſtance, he has fallen very far ſhort of accompliſhing the object which he held in contemplation. His aim was an explanation of a certain phenomenon intimately connected with the knowledge of fever. But I muſt confeſs I am not convinced that he has, on the preſent occaſion, furniſhed us with any explanation at all. To me his obſervations appear calculated, not ſo much to explain as to confound. They teach us nothing except our own ignorance of what we would wiſh to know. Inſtead of explaining the intereſting phenomenon to which they immediately relate, they diſcover to our view various other phenomena, equally curious and difficult of explanation. The Profeſſor, it muſt be acknowledged, has here furniſhed us with certain lights, but, I am ſorry to ſay, they are dim, green lights, of ſuch a nature, as tend only to diſcover to us ſomewhat more of the extent of the circle of darkneſs by which we are unfortunately ſurrounded. Thoſe unacquainted with Dr. Ruſh's love of truth, with his abhorrence of ſophiſtical impoſition, and with his active zeal for the diſcovery and eſtabliſhment of juſt principles in medicine, might be led to believe, that in the preſent inſtance, his only wiſh was, to render his readers unmindful of one difficulty, by engaging their attention to the contemplation of others, equal, if not greater, in the ſcience of phyſics. We find in his propoſed explanation no regular chain of propoſitions, ſhedding each an additional gleam on the object of his reſearch, and by their collective luſtre tending finally to reſcue it from that night of darkneſs in which it has been hitherto involved. Inſtead of this, we are preſented with difficulty preſſing on the rear of difficulty, as if the aggregate appearance of the whole, could in any way diminiſh the real magnitude of either.

What though the wild tornado be a phenomenon diſproportioned in magnitude to the deep tranquility of the atmoſphere by which it was immediately preceded? What though the whirlwind of paſſion be even infinitely paramount to the trifling cauſe by which it was originally rouſed? or, What though there exiſt ten thouſand other inſtances in which effects bear no ſhadow of proportion to the cauſes from which they originally ſprang? Can a bare enumeration of theſe furniſh a ſatisfactory ſolution to the propoſition, "Why exceſs in the force or frequency of the action of the blood-veſſels ſhould ſucceed debility in a part, or in the whole of the body, and be connected for days and weeks with preternatural debility in the muſcles, nerves, brain, and alimentary canal?"—Surely it never can.—Such an enumeration can produce no other effect than that of a deeper regret for the number of phyſical phenomena which, from our humiliating deficiency in ſcience, we are unable to explain. Such an enumeration can only ſerve to bring within the ſphere of our viſion additional tracts of "*Terra incognita*," without communicating to us the ſlighteſt information reſpecting the nature of the climate, the productions, or the ſoil.

Having thus endeavoured to ſhow the inſufficiency of Dr. Ruſh's explanation, it may poſſibly, by ſome, be deemed incumbent on me to attempt one more juſt and ſatisfactory myſelf. This, however, is an office I muſt, at preſent, beg permiſſion to decline. "The ſtripling ſcion cannot bear what bends the lordly oak." Nor do I think it expedient to hazard myſelf in the

perils

perils of an enterprize, where the difficulties are of ſuch a nature as not to have yielded to the experience and abilities of Dr. Ruſh.

To conclude on the ſubject of fever. Dr. Ruſh has favoured the public with a theory of this diſeaſe, of which *ſimplicity* would appear to be the principal aim and characteriſtic. He has attempted, like moſt other ſyſtematic writers, to trace all febrile phenomena immediately up to an original *unity* of cauſe. That cauſe is, as already obſerved, nothing elſe than *diſorder* exiſting excluſively in the *ſanguiferous* ſyſtem. The Doctor would ſeem to have taken little or no note of any thing amiſs either in the abſorbents or nerves. Perhaps in this reſpect his theory may not be altogether free from exception: But I preſume not to decide with reſpect to a point of doctrine, on which perhaps ſome "ſhadows, clouds, and darkneſs ſtill remain."

The theory of fever by Dr. Darwin is much more complicated, and conſiderably more difficult, to be thoroughly underſtood, than that which we have received from the pen of Dr. Ruſh. It would, however, be doing equal injuſtice to the author, and violence to my own feelings, not to declare, that to me it appears characterized by an uncommon degree of ſpeculative ingenuity. Though by no means wholly original, yet, in two reſpects, it would ſeem at leaſt to border on originality, and may be therefore conſidered, in the preſent inſtance, as worthy of particular ſpecification. It repreſents fever as a diſeaſe of *aſſociation*, and furniſhes the moſt happy explication to many morbid phenomena by referring them to the action of the *abſorbent ſyſtem.* Not only in his Supplement on fever, but throughout his whole writings, particularly in his treatiſe on Materia Medica, Dr. Darwin ſeems to have, perhaps with much propriety, ſurpaſſed other phyſicians in his attention to this important ſyſtem of veſſels. By calling to his aid the well known action of the abſorbents, he appears to have ſhed more light on the philoſophy of ſeveral intereſting ſymptoms of diſeaſe, than had been effected either by his predeceſſors or cotemporaries in ſcience.

The Darwinian theory of fever will, no doubt, attract the attention of many phyſicians, will prove a fruitful ſource of medical diſcuſſion, and will probably receive a weighty and reſpectable advocation. But whether or not it will be able to ſet at defiance the hydra-oppoſition of future times, and thus continue, "like the Newtonian Philoſophy, a rock amid the waſte of ages," is an event on the probability of which I am unwilling to pronounce. *Dies doceat.*

To the medical public ſome apology would ſeem neceſſary for the crude and indigeſted ſtate, in which the preceding note on fever is preſented to their attention. Its author flatters himſelf it may be ſufficient for him to obſerve, that the thoughts and obſervations which it contains dropt haſtily from his pen, and were moſt of them neceſſarily hurried into the preſs without having undergone even the ſhadow of correction. To the " *limæ labor*" the reader will readily perceive they have not been ſubjected. Like the plaintive ghoſt of the murdered Hamlet, they were prematurely haſtened to their account " with all their imperfections on their head." Diſtruſtful of themſelves, and conſcious ſuppliants for ſpecial favour, they are anxious for an aſylum, from the ſeverity of juſtice, in the liberality and candour of the enlightened mind.

THE END.